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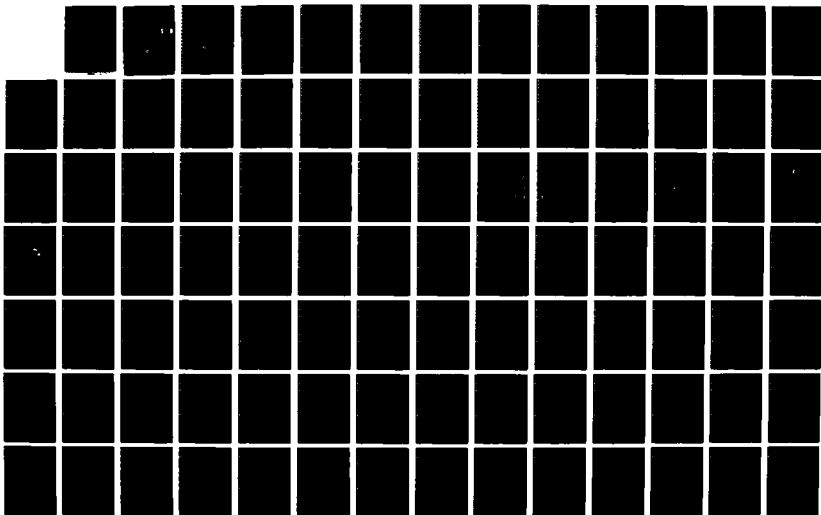
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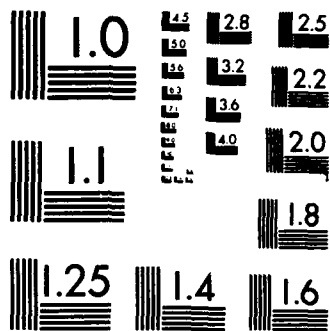
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UNDERWATER ARCHAEOLOGICAL RECONNAISSANCE
AND HISTORICAL INVESTIGATION OF SHIPWRECK SITES IN
LOCKWOOD'S FOLLY INLET
BRUNSWICK COUNTY, NORTH CAROLINA

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AUG 27 1987
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Submitted to:

Unites States Engineer District, Wilmington
P. O. Box 1890
Wilmington, North Carolina 28402

Contract No. DACW54-83-C-0022



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Submitted by:

Gordon P. Watts, Jr., Director
Tidewater Atlantic Research
P. O. BOX 2494
Washington, North Carolina 27889

15 August 1986

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 ABSTRACT

In addition to continuing maintenance dredging activities in Lockwood's Folly Inlet, Brunswick County, North Carolina, the United States Army Engineer District, Wilmington, has developed plans for improving the authorized navigation channel. In response to United States Department of Interior and Advisory Council on Historic Preservation concerns that the proposed activity could impact cultural resources in a proposed National Register District for Civil War shipwrecks, the Wilmington District conducted both historical and remote sensing investigations of the inlet. ^{where the shipwrecks} Examinations of both the documentary and cartographic records associated with the inlet were carried out and several proton precession magnetometer surveys were made to identify magnetic anomalies that might represent historic shipwrecks. Recommendations formulated on the basis of the historical and cartographic research and the remote sensing survey of the project area called for an examination of the magnetic targets and an investigation of three vessels including the shipwreck traditionally identified as the blockade runner BENDIGO. These investigations were carried out for the U. S. Army Engineer District, Wilmington by Tidewater Atlantic Research of Washington, North Carolina. Examination of two of the magnetic targets was inconclusive as no cultural material was exposed. However, the third target was identified as the remains of a modern vessel. Reconnaissance level surveys of ~~two of the vessel~~ sites produced sufficient data to support identification of the wrecks as the blockade runner ELIZABETH and the gunboat U. S. S. IRON AGE. Investigation of the BENDIGO generated data confirming the traditional identity of the ship, assessed the condition of vessel remains at the site, and produced an indication of the nature and scope of the archaeological record associated with the ship. Historical research undertaken in conjunction with the BENDIGO reconnaissance reinforced identification of the site and provided an historical context for assessing the significance and research potential of the wreck.

While project research confirmed the significance of the Lockwood's Folly Inlet vessels as supporting elements of the Cape Fear Civil War Shipwreck District, the high energy inlet environment makes educational and recreational development unrealistic. In addition, the environment places practical limitations on field research. With the exception of technological data associated with the construction of the BENDIGO and information about the cargo of the ELIZABETH, it would appear that on-site research would be difficult to justify. With the exception of highly detailed vessel specific research, most of the historical and archaeological research questions identified in the Cape Fear Civil War Shipwreck District nomination could more effectively be answered by investigation at other shipwreck sites. - These findings suggest that requirements for mitigation should be limited to research objectives associated with unique aspects of the BENDIGO and ELIZABETH, documentation of threatened vessel structure, and archaeological salvage of associated cultural material.

MANAGEMENT SUMMARY

On May 14-18, 1984, Tidewater Atlantic Research carried out an investigation designed to (1) identify magnetic anomalies located during a 1981 remote sensing survey conducted by the Wilmington District and (2) assess the remains of a shipwreck traditionally identified as the blockade runner BENDIGO to determine the vessel's eligibility for nomination to the National Register of Historic Places. During the investigation of the BENDIGO, a fourth wreck was discovered in the project area. Examination of material exposed at the site confirmed that the remains were those of a modern vessel dating from the 20th century. Although the investigation failed to identify the source of two of the remote sensing signatures, reconnaissance level investigations carried out on the remains of two additional vessels generated information that supported identification of the wrecks. Data from the sites and historical research indicates that the remains are those of the USS IRON AGE and the blockade runner ELIZABETH.

Examination of the BENDIGO generated sufficient archaeological data to support a determination of eligibility to the National Register of Historic Places. The remains of the wreck were found to survive in a good state of preservation in spite of the high energy nature of the site location. This state of preservation is primarily a result of the accumulation of sediment in and around the wreck. Probing sections of the hull structure indicated that material associated with the ship remains within the hull although historical records confirm that the majority of the vessel's cargo was removed immediately after the ship was run aground. The engineering record associated with the BENDIGO is known to be very good as sediment has also preserved much of the integrity of the engineering space and machinery.

Historical research and on-site investigation of the remains of the two remaining historic vessels indicate that the wrecks are the Union steamer USS IRON AGE, and the blockade runner ELIZABETH. Although investigation of the remains exposed at each site was limited, this initial inspection confirmed that the wrecks contain sufficient historical and archaeological information to merit additional investigation. At the IRON AGE site, the entire after section of the wreck was exposed revealing a well preserved engineering record, intact lower hull structure, and a considerable amount of material remains associated with the ship. At the ELIZABETH site, only a portion of the steam machinery associated with the vessel was exposed above the bottom surface. However, the magnetometer record associated with the site indicates that a considerable amount of additional machinery, hull structure, and perhaps cargo survives below the bottom surface.

These three vessels are part of the recently created Cape Fear Civil War Shipwreck District and the investigation reported here confirms their importance as contributing elements of the district. Each of these shipwrecks preserves structural, technological, historical and archaeological data that has been determined to be of sufficient significance to support nomination to the National Register of Historic Places. As a National Register property each site must be treated in accordance with specific guidelines developed to protect recognized historic and archaeological values. Due to this special status, consideration should be given to formulating and securing approval for a mitigation plan. In the event that avoidance proves to be impossible or channel migration makes the wrecks a threat to safe navigation of the inlet, the removal or destruction of the vessels should be preceded by archaeologically acceptable mitigation designed to investigate the unique aspects of the BENDIGO and ELIZABETH, document the structure of each threatened vessel, and archaeologically salvage cultural material associated with surviving vessel structure. However, due to the dynamic nature of the Lockwood's Folly Inlet environment, additional on-site investigation should only be a priority for Corps of Engineers sponsored investigation if it is impossible to avoid disturbance and damage to the sites during channel maintenance or improvement activities.

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SECTION 1 - PROJECT INTRODUCTION

INTRODUCTION

In spite of a Union blockade proclaimed by President Abraham Lincoln in April, 1862, Wilmington, North Carolina developed into one of the major ports of Confederate maritime commerce. As the war progressed, vessel traffic into and out of the Cape Fear River increased due both to its geographical proximity to neutral British ports in Bermuda and the Bahamas and the complex problems associated with developing an effective blockade of both inlets to the River. Because Frying Pan Shoal extends more than 20 miles seaward of Bald Head Island, which separates the two Cape Fear inlets, Union vessels were required to maintain a formidable presence off both access channels. This unique geography provided blockade runners with the option to use either inlet in accordance with Union vessel strength and favorable environmental conditions (Soley, 1883). Although the volume of trade through the Port of Wilmington increased during the Civil War, the activities of the Union squadron attempting to establish the blockade made such trading a high-risk operation (Browning, 1980). Today the remains of both Union and Confederate vessels preserve evidence of this Civil War activity and the risk it involved.

At Lockwoods Folly Inlet, thirteen miles west of the southern entrance to the Cape Fear River, historical sources indicate that at least three vessels were lost during the Civil War. Historical research confirms that the ELIZABETH, a wooden side-wheel steamer of more than 600 tons, ran aground on the shoal outside the inlet on 19 September 1863. Four months later in January 1864, the iron paddle-wheel steamer BENDIGO grounded after her pilot mistook the remains of the ELIZABETH for a Union warship and attempted to run between the wreck and the beach. On 10 January 1864, the Union wood screw steamer USS IRON AGE was lost in an unsuccessful attempt to refloat the grounded BENDIGO. On the morning of 11 January 1864, Union sailors preparing to destroy the grounded IRON AGE sighted an additional vessel aground and burning immediately west of Lockwoods Folly. No doubt run ashore after sighting Union vessels attempting to salvage the BENDIGO and IRON AGE, the iron side-wheel steamer RANGER was destroyed before her cargo could be salvaged.

Following the Civil War, navigation at Lockwoods Folly resumed a normal and much less dramatic level of activity. When the United States Army Corps of Engineers carried out a study of the river system in 1879, their report confirmed a nominal level of navigation by small

coastal bottoms (U. S. Army, 1879). This level of trade survived until the establishment of rail service in coastal Brunswick County eliminated the demand for water borne cargo carriers and transportation in the late 1880's. By 1893 only three vessels were reported to be trading on the Lockwoods Folly River (U. S. Army, 1893). Even this marginal activity was not, however, without the loss of vessels. The schooner J. W. POTTER of Wilmington grounded in the inlet in August, 1879 and in March 1907 the schooner JOHN H. KUCK, was destroyed on the bar. A third and larger vessel, the 140 ton schooner MARY J. FISHER was lost off the inlet in August 1881. Unlike the J. W. POTTER and the JOHN H. KUCK, the MARY J. FISHER was engaged in transporting a cargo of coal from Philadelphia to Wilmington and was not engaged in local commerce on the River (Anglely, 1980:33).

In recent years the Lockwoods Folly Inlet channel has migrated to the western extremity of the inlet (Langfelder, 1974; Kimmel, 1982). Today at least two historic shipwrecks lie in the immediate vicinity of the navigation channel. Traditionally identified as the blockade runner BENDIGO and the USS IRON AGE, the wrecks represent potential hazards to safe navigation and obstructions to channel maintenance and stabilization plans which at present are based on a channel alignment running between the two shipwrecks. A proton precession magnetometer survey of the channel carried out by the Wilmington District in 1981 confirmed the presence of additional targets in the study area that could represent additional submerged cultural resources.

In anticipation of potentially adverse impacts associated with future channel maintenance and stabilization activities in Lockwoods Folly Inlet, the Wilmington District initiated research designed to delimit the area of project impact and identify potentially significant resources in the study area. The results of this research, a cartographic study designed to trace migration of the channel, and the magnetometer survey, were presented in a June 1982 report prepared by Richard Kimmel. Based on the recommendations of that report, the Wilmington District issued a work order (SAWPD-83-126) for an investigation of magnetic targets in the inlet vicinity and an assessment of the shipwreck identified as the BENDIGO designed to generate data to support a determination of eligibility to the National Register of Historic Places. Under the terms of an Indefinite Quantity (open-end) Contract (DACW54-83-C-0022) with Archaeological Research Consultants of Chapel Hill, North Carolina, archaeologists from Tidewater Atlantic Research of Washington, North Carolina carried out the reconnaissance and assessment on May 14-18, 1984. Under an extension of the original work order, additional historical and archaeological research is being carried out to facilitate establishing significance criteria for these and other Civil War shipwrecks in North Carolina and developing a plan for mitigation designed to preserve that significance.

PROJECT OBJECTIVES

Historical Research

The primary objectives of historical research associated with the investigation of Civil War shipwrecks in Lockwoods Folly Inlet were to:

1. Develop an historical context for assessing the significance and research potential of the shipwrecks,
2. Identify repositories of primary source historical data and assess the nature of their collections,
3. Evaluate the nature and scope of historical source materials, and determine the nature and extent of gaps in the data base that can be filled by historical and/or archaeological research, and
4. Develop sufficient historical data to support preparation of a determination of eligibility for National Register of Historic Places nomination for the BENDIGO.

Archaeological Reconnaissance

The primary objective of the Lockwoods Folly Inlet reconnaissance was to conduct an assessment of the remains of the iron-hull paddle-wheel steamer traditionally identified as the blockade runner BENDIGO. On-site activities were designed to address a variety of specific questions and generate data to support a determination of eligibility to the National Register of Historic Places. Specific research questions included:

1. Can the remains of the vessel traditionally identified as the BENDIGO be positively identified as that ship,
2. How much of the original vessel structure remains intact at the wreck site,
3. Do artifacts associated with the ship survive in an undisturbed archaeological context,
4. What is the status of preservation at the site,
5. Are structural remains, artifacts, and data preserved at the site archaeologically and/or historically significant,
6. Has channel migration and channel maintenance activity damaged the site, and if so to what extent, and

7. Given the dynamic location of the site can a scientific investigation of the shipwreck be carried out effectively and without excessive expense or hazards to personnel?

In addition to investigating the remains of the BENDIGO, secondary objectives included the examination of the wreck of the IRON AGE and several magnetic targets identified during a proton precession magnetometer survey carried out in November 1981 by the Wilmington District U. S. Corps of Engineers. At the site of the IRON AGE, investigation was oriented toward the conduct of an initial reconnaissance of the wreck site. The reconnaissance examination provided information concerning the type of vessel remains at the site, general condition of the wreck, and precise location and orientation of the hull. Two magnetic anomalies, one located 1200 feet south of the BENDIGO and a second east-southeast of the IRON AGE, were also examined. Objectives of the anomaly investigations included:

1. Identification of the material generating the signature, and
2. Assessment of any cultural material exposed above the bottom surface.

LOCATION OF THE STUDY AREA

Lockwoods Folly Inlet is located on the North Carolina coastal plain approximately 13 miles west of the mouth of the Cape Fear River. The inlet lies approximately 7 miles south-southeast of the small town of Supply in southern Brunswick County, North Carolina. Forming the mouth of the Lockwood's Folly River, the inlet separates two barrier islands known as Long Beach, to the east, and Holdens Beach, to the west (Figure 1).

DESCRIPTION OF THE STUDY AREA

Lockwoods Folly Inlet is an high energy feature of the dynamic North Carolina barrier island complex. During the tidal cycle it serves both the Lockwoods Folly River and Atlantic Intracoastal Waterway. As a result of wave forces and littoral currents, Lockwoods Folly Inlet has been migrating to the west as sand and shell hash composing the bottom sediments are transported and redeposited. Although most of the inlet is shallow with bars to the east and west exposed at low tide, channel depths range from 7 to 13 feet at mean low water. Tidal flow creates currents in excess of 1.2 knots in the main channel at maximum ebb. At the time of these investigations, the main channel skirted the eastern end of Holdens Beach and was aligned almost north

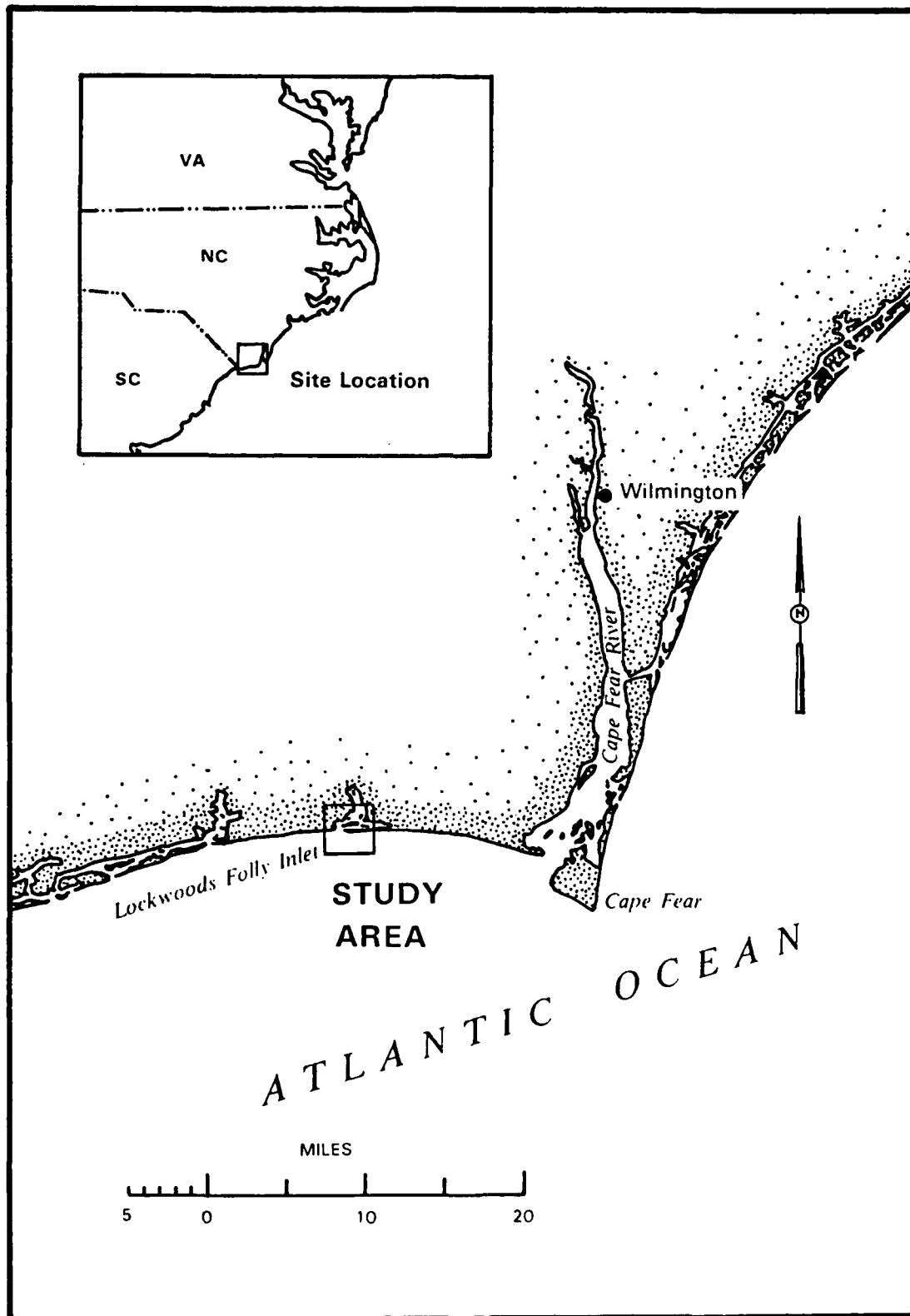


Figure 1, Project Location

to south exiting between the remains of the shipwrecks BENDIGO, located on a shoal extending south from the east end of Holdens Beach, and IRON AGE, located on a shoal extending south from the vicinity of the west end of Long Beach (Figure 2).

SITE SPECIFIC ENVIRONMENT

BENDIGO Site

The remains of the vessel traditionally identified as the BENDIGO lie on the shoal west of the Lockwoods Folly Inlet navigation channel. Water depth in the vicinity of the wreck was found to vary at low tide from 12 inches at the stern to 2 to 4 feet in the vicinity of the engineering space where scouring had created a depression. Forward of the engineering space, water depths increased from 4 feet at the forward boiler to 5 feet in the vicinity of the bow. Bottom sediment was found to be unconsolidated sand throughout the vicinity of the wreck. In the engineering space, an accumulation of shell hash was observed. Visibility in the water column varied with the tide. At low tide the visibility was less than 1 foot but increased to approximately 3 feet at high tide. Probing at the site confirmed that shell and shell hash accumulations exist at lower levels within the hull.

IRON AGE Site

The remains of the vessel traditionally identified as the IRON AGE lie on the shoal east of the Lockwoods Folly Inlet navigation channel. Water depth in the vicinity of the wreck was found to vary at low tide from 3 feet in the vicinity of the bow to 8 feet at the stern. Shoal sediments cover the hull from the engineering space amidships to the bow with unconsolidated sand and light shell hash. Aft of the engineering space sediments consist of unconsolidated sand and in the immediate vicinity of the wreck, shell hash. Outside the confines of the hull bottom, sand has formed waves that vary from 4 inches to more than a foot in height. Visibility in the water column varied with the tide. At low tide the visibility on the wreck was less than two feet but increased to approximately four feet at high tide.

ELIZABETH Site

The remains of the vessel traditionally identified as the ELIZABETH lie immediately south of the shoal approximately 250 yards east of the Lockwoods Folly Inlet navigation channel. Water depth in the vicinity of the wreck was observed to be 10 feet approximately two hours before high tide. Bottom sediments proved to be unconsolidated sand throughout the vicinity of exposed wreckage and the bottom surface was relatively flat. Visibility in the water column was observed to be approximately four feet during the on-site examination.

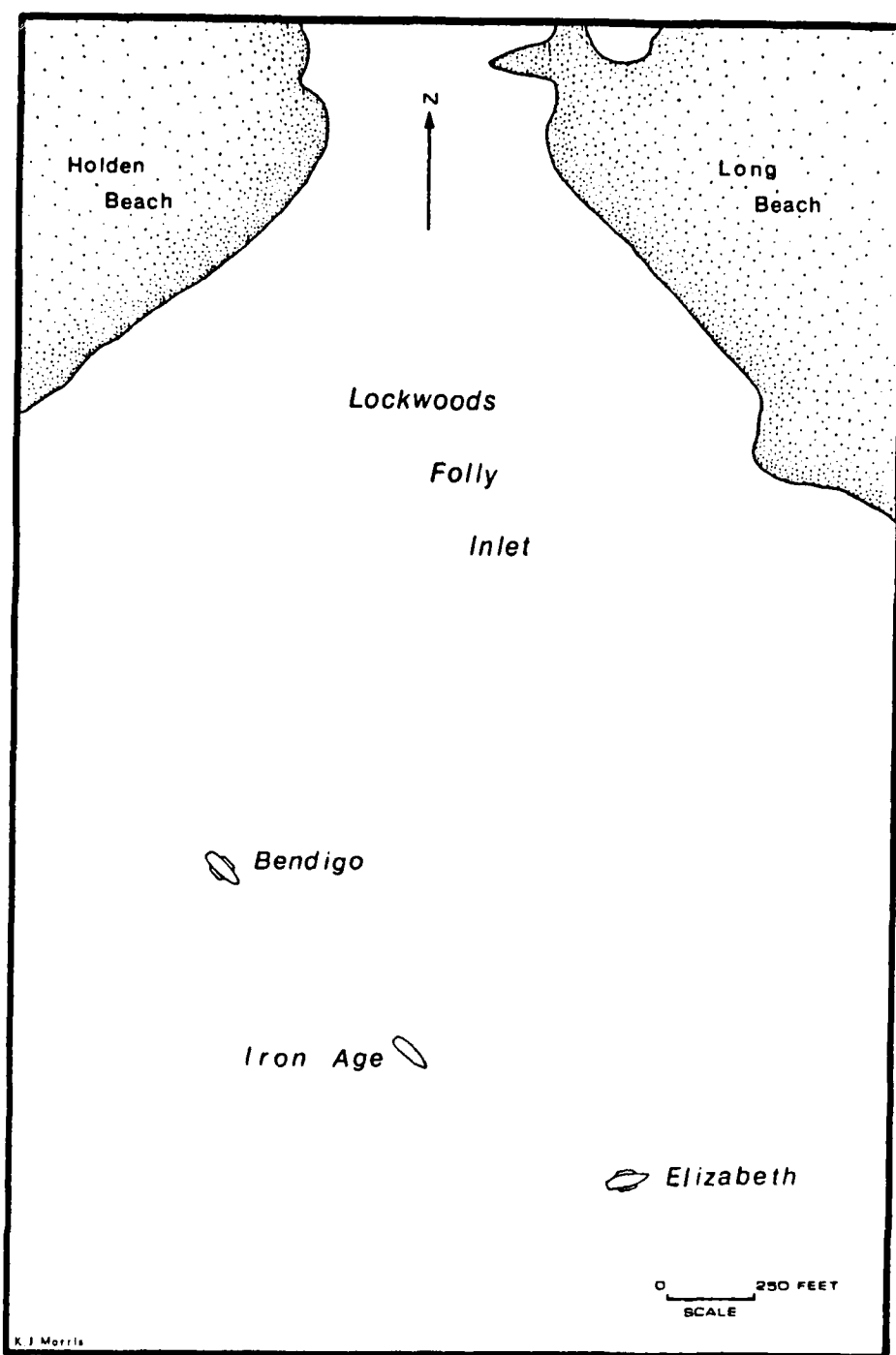


Figure 2, Site Location

Target A

Target "A" was located 100 yards east of the Lockwoods Folly Inlet navigation channel immediately south of the shoal. Water depth at the site was found to vary from eight to nine feet in the vicinity of the target buoy. Bottom sediment consisted of unconsolidated sand. Visibility in the water column was approximately four feet during the on-site examination.

Target B

Target "B" was located approximately 300 yards east of the Lockwoods Folly Inlet navigation channel on the southern extremity of the shoal. Water depth at the site was found to vary from three to five feet approximately two hours before low tide. Bottom sediment consisted of unconsolidated sand. Visibility in the water column was observed to be approximately four feet during the on-site examination.

Modern Wreck Site

The remains of an unidentified modern vessel lie approximately 400 feet southeast of the BENDIGO Site on the shoal west of the Lockwoods Folly Inlet navigation channel. Water depth in the vicinity of the wreck was observed to be three feet approximately 30 minutes after low tide. Bottom sediments proved to be unconsolidated sand throughout the vicinity of the exposed wreckage and the bottom surface was found to be almost flat with the exception of small sand ridges less than six inches in height. Visibility in the water column was approximately three feet during the on-site examination.

SECTION 2 - HISTORICAL RESEARCH

DESCRIPTION OF HISTORICAL RESEARCH ACTIVITIES

Investigation of the historical records associated with Civil War shipwreck sites in Lockwoods Folly Inlet required examination of numerous source materials preserved in a variety of geographically distant repositories. This dictated that research activity be divided into work that could be done in person by project staff and that which had to be carried out by correspondence. While the former could be effectively accomplished within a reasonable schedule, the latter required lengthy and often frustrating correspondence with the staff of repositories in the United States, Canada, Bermuda, and Great Britain. While correspondence research activity was slow, a surprising amount of information was identified and examined.

The historical investigation was initiated with a survey of secondary source data that could be utilized to develop a brief historical context for primary source research. Areas of specific interest that were identified during the development of this historical context became priorities for primary source research. Secondary source materials used to develop an historical context were almost entirely available through the Joyner Library at East Carolina University and the collections of the Program in Maritime History and Underwater Research at East Carolina University. However, more specific secondary source data frequently came from private collections of the author, Dr. William N. Still, Jr., of Greenville, North Carolina, and Dr. Charles V. Peery of Charleston, South Carolina. These sources proved to be readily accessible and a survey of each collection provided all of the basic background data.

The literature and archival investigation was initiated by a survey of secondary source materials associated with the Civil War in southeastern North Carolina. The survey focused on documentation of marine and naval activities associated with the Port of Wilmington, North Carolina that would have been contributing factors in the loss of vessels in the vicinity of the proposed survey areas. In examining secondary sources, special attention was devoted to activities specifically associated with Lockwoods Folly Inlet.

Preliminary wreck-specific information was sought through such secondary sources as the Official Records of the Union and Confederate Navies in the War of the Rebellion, Encyclopedia of American Shipwrecks, Merchant Steam Vessels of the United States 1807 - 1868, Shipwrecks of the Western Hemisphere, Shipwrecks of the Civil War, Shipwrecks of South Carolina, the Official Records of the Union and Confederate Navies in the War of the Rebellion (1894-1914), the National Political Manual (1868), and other published materials. Additional information was generated by a survey of selected North Carolina newspapers, the Wreck Information List of the U.S.

Hydrographic Office, the National Oceanic and Atmospheric Administration Snag Log. Historic maps and charts preserved in the collections of the National Archives, Corps of Engineers records in the Regional Record Center in Eastpoint, Georgia, Peabody Museum, Mystic Seaport Museum, New York Public Library, New York Historical Society, and other North Carolina and South Carolina repositories were also examined.

Relevant manuscript sources of shipwreck data preserved in the North Carolina Division of Archives and History, Duke University, Southern Collection at the University of North Carolina at Chapel Hill, Public Library, Wilmington, North Carolina, Museum of the Confederacy at Richmond, Virginia, South Street Seaport Museum in New York, South Caroliniana Library, University of South Carolina Library, South Carolina State Library, and South Carolina Department of Archives and History in Columbia, and the South Carolina Historical Society Library, Charleston Public Library, and Charleston Historical Society were surveyed for site specific data associated with Wilmington history. A variety of record groups preserved in the National Archives in Washington, D.C., and regional record centers in Bayonne, New Jersey, East Point Georgia, Philadelphia, Pennsylvania, and Boston, Massachusetts were also examined. The submerged cultural resource site file inventory of the Program in Maritime History and Underwater Research at East Carolina University in Greenville, North Carolina was reviewed for underwater sites in the study areas.

Additional sources of historical data associated with Wilmington's maritime history were examined in the collections of the Steamship Historical Society, Baltimore, Maryland, and Mariners Museum, Newport News, Virginia. The Wilmington Daily Journal and Weekly Journal were examined in their entirety for the period January 1861 through June 1865. Charleston newspapers including the Charleston Mercury and Gazette of the State of South Carolina were systematically examined for information on blockade running through Wilmington and specific shipwreck references. Additional information was found in foreign newspapers such as the Liverpool Mercury, Daily Courier, and Daily Post and Illustrated London News preserved in the microfilm collections of the National Archives.

At each repository, card catalogs were examined for specific references to the study area and the region. Map indexes were checked for shipwreck and navigational reference data. The staff of each repository and knowledgeable local researchers were interviewed for source materials and information.

Data produced by the literature and archival research were developed into an historical context for Lockwoods Folly. Within that historical context each category of the underwater archaeological resource identified by the research was located, evaluated, and assessed for research data potential. Salvage or other activities that would have altered the condition of shipwreck resources were

noted and, where possible, analyzed for effect on site significance and research potential. The historical background has been developed to serve as a planning reference to assist the Wilmington District in designing and implementing intensive surveys to identify and evaluate the potential cultural significance of submerged anomalies and evaluate the potential National Register eligibility of submerged cultural resources that will be directly affected by construction of proposed navigation improvements.

Primary source data proved to be considerably more difficult to identify and examine. Sources proved to be scattered throughout American, Canadian, British and Bermudian repositories. Materials in American and Bermudian repositories were examined first hand by the author or one or more project research assistants. Due to the expense of traveling in Great Britain, research in England, Scotland, and Canadian repositories was carried out through correspondence with repository and institution staff members or independent research contacts. Unfortunately, this was both time consuming and not particularly effective as postal communication was difficult and agency, institutional, and individual priorities took precedence over foreign inquiries. Yet, in spite of these difficulties, considerable data were identified and examined.

Through correspondence, records collections in the National Maritime Museum at Greenwich and Public Records Office in Kew Gardens were surveyed for data related to American Civil War blockade running and the Lockwoods Folly Inlet shipwrecks. Additional information was obtained from the City of Liverpool Museums, The Merseyside Confederate Navy History Society, General Register and Record Office of Shipping and Seamen, Cardiff, University of London, and Museum of Transport, Glasgow, Scotland. Canadian information was secured from the National Archives in Ottawa and through the Hamilton and Scourge Project.

HISTORICAL BACKGROUND

On April 19, 1861 newly elected President Abraham Lincoln issued a proclamation establishing a blockade of Confederate ports in South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. Eight days later, Lincoln extended the blockade to include ports in Virginia and North Carolina.

Historians generally agree that the Union navy's major objective in the Civil War was the establishment and maintenance of the blockade. This was determined on April 19 when Lincoln proclaimed a naval blockade against the seceded states. Secondary objectives included the protection of American foreign commerce, and the support of land operations. Both the blockade and the support of land operations would necessitate coordinated activities, including amphibious

operations, against the Confederate states. Union Secretary of the Navy Gideon Welles acknowledged these objectives in his annual report for 1861 when he wrote:

1. The closing of all the insurgent ports along a coast of nearly three thousand miles, in the form and under the exacting regulations of an international blockade, including the naval occupation and defense of the Potomac river,
2. The organization of combined naval and military expeditions to operate in force against various points of the southern coast, rendering efficient naval cooperations with the position and movements of such expeditions when landed, and including also all needful naval aid to the army in cutting intercommunication with the rebels and in its operations on the Mississippi and its tributaries; and
3. The active pursuit of the piratical cruisers which might escape the vigilance of the blockading force...

These objectives determined Union naval strategy for the war (Welles, 1861).

Lincoln's blockade created a variety of problems for the United States. While many problems were associated with complex issues of international law, others were related to the mechanics of actually enforcing the proclamation. After decades of Congressional neglect, the United States Navy was totally incapable of effectively closing southern ports.

In 1861, the Navy register listed only ninety vessels, fifty of which were propelled by sail and were considered obsolete for the task at hand. The remaining forty were steam, but several of the deep draft vessels proved unsuitable for the shallow southern waters. Eight others were in laid up while twenty-two vessels remained at station off foreign shores and would require at least six months travel to reach the United States (Browning, 1980:24). With the Confederate capture of the Norfolk Navy Yard, the Union lost over 3000 pieces of ordnance and eleven ships (Browning, 1980:23). To compound the problem, over 250 of the United States Navy's best officers resigned to join the Confederate Navy (Engle and Lott, 1975:180).

Within a few months of Lincoln's proclamation, the new Secretary of the Navy, Gideon Welles, took steps to implement an effective blockade off the southern coastline. The Navy Department bought or leased practically anything that could float or carry a gun. Welles accomplished an amazing feat in nine months. The Navy purchased 136 ships, constructed fifty-two, and commissioned and repaired another seventy-six (Engle and Lott, 1975:180). By the war's end, the Navy

would employ at least 600 vessels (Browning, 1980:40). Welles also tackled the problem of a manpower shortage since the Navy lacked adequate crew for so many new vessels. Within a year, 14,000 enlisted men and 1000 officers joined the Union Navy (Engle and Lott, 1975:180). At first, the number of applicants rather than their skill represented the greatest contribution. Experience often constituted the only method of training (Browning, 1980:55).

The Union blockade in turn gave rise to the practice of blockade running. At the beginning of the blockade, practically any vessel was considered suitable for breaking through the Atlantic squadrons to carry cargo in or out of the isolated southern ports. The most successful of the early runners were steamers that had belonged to the Southern Coasting Lines and were out of work with the outbreak of the war. The illicit trade carried on by these ships reaped considerable profit but did not compare with the capital brought in later in the war.

Efficiency and success prompted a general conversion of sail to steam powered blockade runners. While the Union squadrons increased and developed operational tactics, the demand for southern manufactured goods tripled abroad. The Confederate government as well as the private entrepreneur realized the potential for tremendous profit in blockade running. The situation warranted the design of swifter, sleeker vessels.

The typical blockade runner of 1863-1864 was usually a low, side wheel steamer ranging from four to six hundred tons with a sharp and narrow frame (Soley, 1883:156). Although both screw and sidewheel vessels were employed, the twin screw steamer, least vulnerable under fire, became the most common toward the end of the war (Browning, 1980:152). The hull of the vessels rose only a few feet out of the water and was painted a dull grey or lead color for camouflage. This obscured visibility by daylight at two hundred yards (Soley, 1883:157). The deck of the vessel was built in a "turtle back" form to aid transport in heavy seas. To maintain a low profile, the new runners displayed no yards and a light pair of lower masts. Only a small crow's nest broke the ship's profile and ship's boats were kept lowered to the gunwale. The steamer burned anthracite coal whenever it was available because it produced little or no smoke compared to soft coal. On approach to shore, the paddle wheels were muffled, steam blown under water, and all visible lights extinguished to prevent detection (Browning, 1980:152).

The Confederate government developed a nearly flawless trading system through the exploitation of blockade running. Government officials instructed agents in England to purchase vessels specifically suitable for the run, to load these ships with munitions, and to place them under the command of Confederate naval officers. These ships, cleared under the English flag as required by law but later transferred to the Confederate flag, proceeded to conduct regular trade with such ports

as Nassau, Bermuda, and Wilmington. The Confederate government owned three or four such vessels and retained part ownership in several others. The vessels carried out cotton on government account and brought back supplies. The most famous of the government owned runners was the Clyde-built iron side-wheel steamer R. E. LEE. The LEE, under command of Captain Wilkinson, a former navy officer in Confederate service, made twenty-one successful runs during 1862-1863 and supplied foreign markets with 6000 bales of cotton (Soley, 1883:155-156). Since the blockade heightened the demand for cotton causing its market price to triple, the Confederate government was able to establish credit on the continent and turn blockade running into a lucrative venture (Browning, 1980:165-166).

The Union navy's acceptance of a blockade of the Southern coastline as its major strategic responsibility made combined operations a necessity. For the blockade to be effective, bases for refueling and maintenance would have to be established at selected sites along the Southern coast. The adoption of steam propulsion made a close blockade more realistic, but it created logistical problems. Guarding some 3,000 miles of coastline with dozens of ports, inlets, and rivers, would require a great armada of ships. These vessels had to have support facilities within a short cruising distance of their blockading station. It would have been extremely difficult to have maintained a close blockade if the vessels had to periodically leave their station for fuel or repairs. This was particularly true of vessels stationed along the South Atlantic coast and in the Gulf of Mexico. These problems were initially addressed by a blockade board or board of strategy appointed by the Secretary of the Navy, Gideon Wells, in May, 1861. The board, which included representatives of the Army, Navy, and the Coast Survey, prepared ten reports and memos which outlined hydrographic conditions along the Southern coast, points to be seized for bases, and advised an increase in the number of blockading squadrons.

At the beginning of the war, two blockading squadrons were created, one in the Atlantic and one in the Gulf. The board recommended that each be divided into two squadrons. The Atlantic Squadron was divided into the North Atlantic Blockading Squadron and the South Atlantic Blockading Squadron, the dividing line being the border between North and South Carolina. The Gulf Squadron was divided into the East Gulf Blockading Squadron and the West Gulf Blockading Squadron. The Eastern Squadron was given the responsibility for all of Florida east of Pensacola and including the Atlantic coast as well as the Bahamas and Cuba. The Western Squadron was to blockade the Gulf ports west of Pensacola.

The board's concern for bases along the Southern coastline resulted in expeditions to occupy Hatteras Inlet, North Carolina, Fernandina, Florida, Port Royal, South Carolina, and Ship Island, off the Mississippi coast. This was the genesis of the initial combined operations along the Southern coastline. Although the Army was

represented on the board and Army units would be required for these operations, there is no evidence that it looked at the expeditions' objectives as anything more than for naval purposes. Apparently there was little interest in using them as beachheads to secure objectives inland. Major General McClellan evidently tried to interest the board in using these bases, especially those to be seized along the eastern seaboard, as staging points to attack key railway lines in the interior, but with little success (Reed, 1978:39). Later, after being appointed Chief of Staff, McClellan would attempt to implement this concept.

The seizure of Hatteras Inlet was the first sizeable combined operation along the Atlantic coastline. The blockade board had recommended the operation, and information that Confederates were fortifying the inlet as a base for privateers resulted in a decision to mount the expedition. A small naval force under the command of Flag Officer Silas Stringham, a forty-two year veteran of the Navy, arrived off the inlet on August 26th. The 860 troops under the command of General Ben Butler were not needed. After heavy bombardment, the two forts guarding the inlet surrendered the following day. Although the bombardment of Port Royal would receive far more attention then and later, the heavy bombardment against the Hatteras forts clearly demonstrated the strength of naval gun fire against shore positions. As Bern Anderson rightly said, "...this was an important action if only because it was the first of its kind" (Anderson, 1963:51).

Over two months would lapse before the next operation along the coast occurred. On November 4th, Flag Officer Samuel Du Pont arrived off Port Royal, South Carolina with a powerful naval force of over seventy vessels. With the division of the Atlantic Squadron, Du Pont had assumed command of the South Atlantic Blockading Squadron in September. Du Pont, while head of the blockade board, had been instrumental in preparing the plans for the Port Royal expedition and undoubtedly this was a major factor in the decision to appoint him to the command.

Du Pont was a member of a prestigious New York business family and respected by his peers. He was an able naval officer although not aggressive. He was highly lauded for his role in the Port Royal expedition. On November 7, his warships bombarded the forts guarding the bay for four hours before they surrendered. The following day the first contingent of troops under General Thomas W. Sherman disembarked and occupied the abandoned forts. As at Hatteras Inlet, the forts fell to naval gunfire.

To the Navy, the Port Royal expedition was the first step in providing blockading vessels with repair and coaling facilities along the South Atlantic coast. The second step was the seizure of Fernandina. The Army, however, had other objectives. McClellan had envisioned Port

Royal as a stepping stone to attacking by land Charleston, Savannah, and the important railroad that ran between the two ports, and linked the southeastern states with Virginia. General Sherman favored moving against Savannah. The seizure of these ports and the railroad had some hope of success immediately after Port Royal fell, but for various reasons the operations were not carried out. The Navy had little interest at that time in an attack on Charleston or Savannah, which included a plan to sink vessels loaded with stone to block the channels to the ports. Du Pont was occupied with strengthening the blockade and gave only half-hearted attention to Sherman's efforts to attack Savannah. Sherman's troops were unreliable and reinforcements were not provided.

Transportation was not available to carry the troops from the Sea Islands to the mainland and provide logistical support. Finally, Robert E. Lee had assumed command of Confederate defenses in the area and began constructing defense points along the river approaches to the ports and railroad (Reed, 1978:44-51; Hayes, 1969 Vol. I:39). Although Fernandina would be seized in the spring of 1862, this would be the last successful combined operation of any size on the South Atlantic coast. Charleston and Savannah would eventually be taken, not as a result of combined operations but primarily from the land.

Strategically, similar operations along the North Carolina coast were equally fruitless, although they had initial success. In September 1861, General McClellan agreed to an expedition to capture Roanoke Island, North Carolina. Major General Ambrose E. Burnside, who may well have originated the plan (both McClellan and Burnside claimed it) (Barrett, 1963:66; Reed, 1978:39-40), would command the military force which he would recruit and train. Flag Officer Louis M. Goldsborough, who had replaced Silas Stringham in command of the North Atlantic Blockading Squadron in September, was ordered to command the naval part of the expedition.

McClellan, Burnside and Goldsborough all had somewhat different objectives in taking the island. McClellan wanted it as a base of operations from which to move against the Wilmington and Weldon Railroad. Naval cooperation would be essential to gain control of the sounds and the streams that flowed inland towards the railroad. Burnside agreed with this objective, but also believed that the ultimate objective should be Confederate forces in Virginia. To Goldsborough the island would provide a base to blockade the important interwater route to Norfolk. He realized the importance of the sounds and the two canals (Dismal Swamp and the Albemarle and Chesapeake) to Norfolk and Southeastern Virginia.

On February 7, 1862, some 10,000 troops under Burnside's command joined Goldsborough's force of seventeen shallow draft gunboats in assaulting the Island. Under the protective umbrella of the Union warships, the troops landed in waves similar to the pattern employed

in the Pacific in World War II. In addition to providing the assaulting troops with fire support, Goldsborough's active vessels defeated a small force of Confederate gunboats and bombarded forts Hatteras and Clark until they were effectively neutralized. Two days after the initial landing, the island was secured.

It was along the double coastline of North Carolina that an important part of the Union blockade concentrated. Although the shallowness of the sounds created by the Outer Banks hampered shipping, a thriving marine commerce existed in several North Carolina deep water ports. Beaufort Harbor on Topsail Inlet was the first deep water port south of Norfolk. Vessels drawing up to fifteen feet at low tide and eighteen feet at high tide could safely approach the harbor. Morehead City, south of the town of Beaufort, held great promise for the Confederacy as the port which was associated with the site of the Atlantic and North Carolina railroads. Morehead City constituted one vital link between the sounds and the interior of the state (Wise, 1983:12). Wilmington, approximately 90 miles south of Beaufort on the Cape Fear River, provided North Carolina with yet another deep water port. The Union would come to recognize the significance of Wilmington to the Confederate nation.

Despite Confederate attempts to demonstrate that the blockade was ineffective, the vessels of the North Atlantic squadron operated on an assumption of efficiency. Three months after the proclamation on July 13, 1861, the *DAYLIGHT* arrived off the coast of Wilmington and began to cruise the area. Formal declaration of the blockade of this port came eight days later. As early as August 1861, the first step had been taken to convert the commercial blockade into a military occupation with the capture of forts Hatteras and Clark at Hatteras Inlet (Soley, 1883:90). From Hatteras, a Union naval force of seventy-five vessels, thirty of which were fighting ships, proceeded up the sound to attack Roanoke Island. After two days of battle between the Union fleet and the fort on the island, Roanoke fell. With the occupation of Hatteras and Roanoke, the blockade held sway over every inlet from Norfolk to Wilmington and the sound's small commerce came to a grinding halt (Hill, 1976:150,:200-211). Beaufort became the center of occupation for the Union squadron although the squadron headquarters and flagship remained at Hampton Roads (Soley, 1883:91). Wilmington, however, would not fall as easily.

By 1860, Wilmington had emerged as a modern shipping center with excellent internal communication. Three railroads ran through the city and a daily steamboat ferry service left her docks to travel up the Cape Fear River to Fayetteville. Steamboat lines ran from Wilmington to Charleston and New York City while schooners and brigs crowded her wharves carrying exports of turpentine, resin, tar, lumber, cotton, and grains (Wise, 1983:13). With the capture of New Bern, Roanoke Island, and Beaufort, Wilmington was the only North Carolina port open for the importation and exportation of goods. As

long as supplies were imported into the two inlets of the Cape Fear River and were exported on the railroad lines which connected with Lee's army in Virginia, the Confederacy had a lifeline. Wilmington was the most vital seaport the south would have during the war (Pleasants, 1979:15).

Wilmington became the key port for runners largely because of the topography of her location. Located twenty-eight miles from the mouth of the Cape Fear River, the port had access to the Atlantic through two separate entrances; eastward from the New Inlet and southward through the river's mouth. Although the two entrances were only six miles apart, Smith's Island, a strip of sand and shoal, lay in between. Continuing along Cape Fear was the dangerous Frying Pan Shoals which extended ten miles farther making distance by water between the two entrances a little less than forty miles (Soley, 1883:91).

This geographical configuration proved highly advantageous for the blockade runner. When leaving Wilmington, runners could see the location of squadron forces at each inlet and could plot the best route for escaping. Ships coming into Wilmington were favored by a shallow coastline which allowed the blockade runners to hug the surfline while gaining entrance to the river. The Union squadron was hard pressed to eliminate vessel traffic along the two inlets (Pleasants, 1979:4-5).

The initial blockade of Wilmington proved ineffective. When the DAYLIGHT, the first and at that time the only union vessel sent to blockade these waters, arrived, she immediately experienced the difficulties associated with guarding the dual entrances of the Cape Fear River. While pursuing a steamer out of the western bar entrance, the DAYLIGHT inadvertently allowed several other small vessels to pass out the New Inlet entrance. Within three months of the DAYLIGHT's arrival, forty-two vessels either entered or cleared Wilmington (Browning, 1980:27).

The one factor which hampered North Carolina's shipping worked against the Union blockade at Wilmington. From the Chesapeake southward, the coastline was low and sandy. Ridges of sand, occasionally broken by river mouths, reached out from the mainland forming sounds of varying depth. The continual wearing of the banks caused by river flow, created extensive submarine banks, shoals, and bars (Wise, 1983:8). Deeper drafted vessels could not navigate in such waters. The most detrimental factors faced by the United States Navy during an attack against Wilmington were the bars located off the entrance of the Cape Fear River which made navigation hazardous for larger vessels. During foul weather, communication among the Union squadron was virtually impossible. A trip around the shoals took a vessel approximately six to eight hours to complete while small boats could convey communiques

more rapidly across the shoals. During bad weather such trips were impossible and communication could be halted for as long as a month, sharply reducing the efficiency of the squadron.

Because of Wilmington's unique geography, the blockade had to increase in strength and develop a specific enforcement strategy. The North Atlantic Blockading Squadron was arranged to form three defensive lines in which to catch a blockade runner. The first line of defense ran in an arc from Cape Lookout south to 32 degrees north. The next came sixty miles closer to shore, while the last line surrounded the immediate Cape Fear River area (Pleasants, 1979:5-6). Smaller vessels were stationed as near the bar and batteries as draft would allow. A line of larger vessels pressed in the smaller craft. Vessels on the outer line were allowed to harass blockade runners, while those on the inner line were commanded to remain on station. At night all vessels were kept underway. By the fall of 1864, the squadron stationed at the two entrances of the Cape Fear numbered fifty vessels, some reported to be the fastest in service (Soley, 1883:93-94).

With the number of vessels off the inlets on the increase, the Union squadron extended its territory as far south as Little River, South Carolina and north as far as New Topsail, North Carolina. When conditions warranted, these vessels could move their operations outside their designated areas. This extension allowed Union ships to venture to surrounding inlets, destroying salt works, ships, and supplies (Browning, 1980:90). Nowhere, however, was the activity of the blockade more arduous and difficult than at Wilmington. During the war, the squadron captured or destroyed sixty-five steam blockade runners off Cape Fear shores; yet, the blockade running vessels continued to effect an entrance to port. Despite increased efficiency in union strategy, the blockaders could not possibly completely seal off a well fortified port with tremendous trade incentive (Soley, 1883:94).

Capture of Wilmington proved impossible because the inlets of the Cape Fear were guarded by forts and lesser works. The construction of these fortifications became known as the Lower Cape Fear Defense System, the heart of which was Fort Fisher. Fisher, located on Confederate Point, began as a small earthworks to protect New Inlet. By 1864 Fort Fisher was known as the largest seacoast fortification in the south. Shaped like an inverted L, Fisher's land face ran 628 yards and sported twenty of the heaviest seacoast guns. The seaface ranged 1898 yards and contained the mounting of twenty-four heavy guns including a 130 pound Armstrong rifle and a 170 pound Blakely, both from England (Browning, 1980:35). Extending from the land face was a string of torpedoes, which could be exploded from inside the fort (Pleasants, 1979:22). Mound Battery, towering to the height of 60 feet with two mounted heavy guns, stood near the end of Confederate Point. Augusta Battery, which stood behind Mount Battery, was located near the river (Pleasants, 1979:24).

Fort Holmes, on the other side of New Inlet on Smith's Island, shared the protection of Smith's Inlet in the Cape Fear River. Opposite Holmes was Oak Island which held another series of forts and batteries, such as Fort Campbell, Fort Caswell, and Battery Shaw (Pleasants, 1979:24). Fort Caswell guarded the western bar entrance. Captured by Confederate militia on April 14, 1861, Caswell was renovated into a strong casemated work with new armament which consisted of seven 10 inch and four 8 inch Columbiads and a 9 inch Dahlgren gun (Browning, 1980:35; Pleasants, 1979:24).

Up the river were a series of forts and batteries used as secondary defense for Wilmington and as protection for blockade runners leaving Smith's Inlet. Fort Lamb was located on the west side of the Cape Fear River on Reeve's Point. Above Lamb was Fort Anderson, the most important of the secondary defenses. Partially built from the ruins of Old Brunswick Town, Anderson consisted of a series of trenches and earthworks approximately a mile long. Three smoothbore 24 pounders, three rifled 32 pounders, and six smoothbore 32 pounders comprised the Fort's armaments. By 1864 Fort Anderson had become an examining station for all craft heading up the Cape Fear River to Wilmington (Pleasants, 1979:25). Several lesser forts Stokes, Lee, French, Campbell, Strong, and Sugarloaf - rested on the east side of the River (Pleasants, 1979:25).

Forts and lesser works did not constitute the only means of defense in the lower Cape Fear region. In 1862, the ironclad NORTH CAROLINA was constructed and taken into Southport. Since she was too heavy to cross the bar, the NORTH CAROLINA was used as a guardship to protect Old Inlet (Pleasants, 1979:69). While the vessel initially provided an effective psychological deterrent, a Union reconnaissance expedition learned in June of 1864 that the NORTH CAROLINA was no match for a monitor (Browning, 1980:94). This information was confirmed when the ironclad succumbed to shipworms and sank near Smithville (Pleasants, 1979:69).

In 1864 another ironclad was constructed and taken to the mouth of the Cape Fear River. On the night of May 6, the ironclad RALEIGH headed straight for the Union squadron intent on raising or weakening the blockade. She was initially mistaken as a blockade-runner and fired upon by one of the Union vessels. After a shot was fired, and the Union vessel concluded that the RALEIGH was one of the blockading squadron. Upon closer inspection, the Union vessel correctly identified the ironclad and slipped away without further incident. The U.S.S. BRITANNIA and the U.S.S. HOWQUAH were not as fortunate. Through an exchange of shots, the BRITANNIA's binnacle light was shot away and the HOWQUAH received damage to her smoke stack. Both ships were able to elude the ironclade after the initial confrontation. By daylight the blockading squadron had exchanged enough shots with the RALEIGH to decide to keep distance. Ironically, as the RALEIGH headed back across the bar and entered New Inlet, she ran aground and could

not be refloated. The ironclad broke apart under her own weight but not before she had been stripped of guns and equipment (Pleasants, 1979:69-70). The RALEIGH had an effect on the Union squadron despite her early demise. Although no Union vessel was lost, paranoia ran high throughout the squadron. As one defense against the Confederate ironclad, the vessel VIOLET was fitted with a spar torpedo which would explode upon contact with the RALEIGH (Browning, 1980:142-143).

Although Wilmington was the key port for runners on the southern coast, the state of North Carolina fell considerably short of necessary troop supplies by 1862. The governor, recognizing that the inability to supply state troops was a potential threat, made arrangements for the sponsorship of a state operated blockade runner (Wise, 1983:213). In 1862 the state purchased the English steamer LORD CLYDE and renamed her the ADVANCE. With the ADVANCE and interest in three other steamers, North Carolina came closer to self-sufficiency than any other southern state on blockade (Browning, 1980:168).

Since the Confederate government had a vested interest in blockade running, Confederate authorities established regulations to keep running activities moving smoothly. In 1864, Lieutenant John Wilkinson was assigned as head of a naval contingent to oversee and assist blockade runners at Wilmington. The seventy man force under Wilkinson was to inspect runners and enforce government regulations (Wise, 1983:332). Vance, the governor of North Carolina, started to take his own steps to improve the efficiency of the running business. The purchase of the ADVANCE had proven to be a shrewd investment as she had made eight trips through the blockade by 1864. The cargo, which usually consisted of troop supplies, was distributed through the state and any surplus sold to the Confederate government for a small price (Wise, 1983:333). Fearful of the ADVANCE's capture by the Union blockade off Wilmington and the subsequent loss of future capital, Vance entered into a contract with a private company to provide additional steamers for the state. Vance sold one-half interest of the ADVANCE to another private company and purchased one-fourth interest in the original contracted business. State bonds were used as barter for cotton and the contracted company agreed to provide crew and officers as well as handle operations of Wilmington and the West Indies (Wise, 1983:334).

The arrangement went well in the early months of 1864 but conflict of interest arose when Confederate authorities at Wilmington insisted that Vance and the North Carolina vessels were not in compliance with regulations. As long as the state owned the ADVANCE, the war department could not interfere, but according to regulation, the ADVANCE, now partially owned by a private company, had to give up one third of her cargo space. The Confederate Secretary of War feared the

turmoil which could result if other states began to make similar arrangements with blockade running companies. Much to his displeasure, Vance was forced to comply with the government's regulations (Wise, 1983:335-337).

The profit at the beginning of the war was not enough to risk losing a ship on a trip to or from Europe. As the need for war supplies mounted, private companies and government agencies realized the potential of blockade running. An increasing number of vessels attempted to run the blockade despite the odds. In 1861 a runner had a one in ten chance of being captured, one in eight in 1862, and a one in four in 1863. With increased naval strength on the blockade, a runner had only a one in three chance in 1864 and in 1865, the chance for success was only one in two. Yet, the ports did tremendous business. In Wilmington in 1863, 114 vessels successfully ran the blockade. Estimates for that year suggested that as many as 35 vessels a month were entering Wilmington through the blockade (Browning, 1980:170).

The total number of vessels which ran the blockade into Wilmington during the war is unknown. The harbor master for the port estimated that between 1863 and 1864, 260 vessels entered Cape Fear. Another source placed the figure at 397 while Colonel Lamb of Fort Fisher said that at least one hundred different vessels ran the blockade (Browning, 1980:173).

The principle cargo aboard these vessels leaving port was cotton. Between January and September 1863, 30,851 bales of cotton were shipped on government account from Wilmington. From March to December 1864, 27,299 bales of cotton left port despite the increased blockade. These shipments alone were worth \$5,296,000 (Browning, 1980:173). Other cargo left port besides cotton. During June and July of 1864, Wilmington sent the arsenal at Columbia, South Carolina such items as 1,000,000 pistol caps, 1,250,000 musket caps, 196 sheets of copper, and three cases of sewing machine thread on spools (Browning, 1980:174). Wilmington imported cargoes of guns, food such as coffee and meat, lead, cloth for uniforms, stockings, thread, civilian clothing, drugs, medicine, copper, salt peter, and zinc (Pleasants, 1979:39).

The overall effectiveness of the Union blockade is debatable. In 1861 twenty-one steamers and 253 sailing vessels ran the blockade off just the North and South Carolina coastlines (Price, 1948:199). In 1862 the number of sailing vessels who were successful in their attempts dropped to 145 but the number of successful runs by steamers rose to forty-five (Price, 1948:199). Although steps were taken to increase effectiveness of the blockade throughout the war, the end results, at least for these two states, were minimal. Between 1861-1865, over 2054 attempts were made by sail and steam vessels to run the blockade.

Only 319 attempts failed. At the war's end, the Confederacy boasted an 84% success rate and the navy blockade appeared highly ineffectual (Price, 1948:237).

One of the reasons the blockade was so ineffective was the Union squadron's inability to close the port of Wilmington to vessel traffic. The geographical configuration of the lower Cape Fear River and the lower Cape Fear Defense System thwarted Union efforts to close the port. In spite of three cordons of Union warships, fast steamers continued to carry essential cargo in and out of Wilmington until the fall of Fort Fisher on January 15, 1864.

SECTION 3 - ON SITE ACTIVITIES AND FINDINGS

DESCRIPTION OF RECONNAISSANCE ACTIVITIES

Prior to the initiation of on-site operations at Lockwoods Folly Inlet, a pre-dive meeting was held in Wilmington, North Carolina. That 14 May 1984 meeting was attended by representatives from the Wilmington District U. S. Army Corps of Engineers and Tidewater Atlantic Research of Washington, North Carolina. In addition to formulating plans for diving operations, vessel schedules, and crew responsibilities, the project objectives were reviewed.

The following day, the Corps of Engineers survey vessel GILLETTE was employed to position a reference buoy at the site of the anomaly 1,200 feet south of the remains of the BENDIGO. Once the GILLETTE had identified the target location using a Motorola Mini-Ranger II, a twenty foot Boston Whaler was used to deploy scuba equipped archaeologists. Because of the proximity of the shoal, the dive platform was not anchored at the site. In continuous operation during the on-site investigation, the whaler was free to address seas and was available should inlet currents carry dive personnel away from the work area. An additional vessel provided and staffed by the United States Coast Guard, OAK ISLAND, monitored traffic in the vicinity of the diving operations and insured that vessels navigating the inlet were aware of the diving operations and maintained a safe distance. During the forty-five minute examination of the bottom surface in the vicinity of the reference buoy, an area approximately 300 by 500 feet was examined. No evidence of material generating the magnetic signature was identified and operations at the site were terminated.

Upon completion of the investigation of the anomaly south of the BENDIGO, an initial examination of that wreck was carried out. This initial inspection of the site was carried out to determine the amount of exposed hull structure available for examination and assess the environmental conditions. Preliminary measurements of the exposed boilers were made to facilitate development of a scale to be used in working with aerial photographs of the wreck. Before departing the site, additional wreckage observed 400 feet to the southeast of the BENDIGO was examined. A brief inspection confirmed that the exposed material was associated with a modern wreck. Two welded steel tanks, rubber hose, pipe, and angle iron frames were located before the examination was terminated.

The following day a detailed examination of the remains of the BENDIGO was made during high tide. A plan of the exposed vessel structure was compiled and measured drawings of the exposed machinery produced. Mapping the site was completed before the falling tide and rising surf reduced visibility around the wreck to almost zero. After

establishing a baseline to control the collection of data generated by hydraulic probing of the hull remains, activity at the site was halted.

In the afternoon, following an unsuccessful attempt to locate the remains of a shipwreck identified on a 1916 United States Army Corps of Engineers chart of Lockwoods Folly Inlet, an investigation of the IRON AGE was undertaken. As an extensive amount of the after section of the ship was found exposed, on-site activity was oriented toward the collection of data to support the production of a sketch map of the wreck. A detailed examination of the ship structure lying between the boiler and the rudder was carried out using the propeller shaft as a frame of reference. Before leaving the site a series of visual ranges were identified to insure accurate relocation.

On the following morning, 17 May, the GILLETTE returned to rebuoy the anomaly 1200 feet south of the BENDIGO. A proton precession magnetometer operated from the Boston Whaler was used to refine the position of the target. The signature proved to be 300 feet east of the position of the reference buoy deployed by the GILLETTE. Approximately 400 feet to the east of the target a second and smaller anomaly was identified and buoyed. In the process of refining this signature, a third target was located 350 feet to the east. The signature for this anomaly was refined to produce a maximum distortion of more than 1,000 gammas. In the process of marking the site, the buoy weight was fouled, confirming the presence of material above the bottom surface. With the magnetic targets refined and identified with buoys, magnetometer operations were halted.

During the afternoon, a 90 foot baseline was established on the BENDIGO site. Deployed to parallel the keel of the BENDIGO, the baseline originated at a centerline point on the aft boiler and extended west-northwest to a reference rod driven into the shoal immediately outside the stern of the wreck. Polypropylene line was stretched between the two points and a 100 foot tape was attached to the boiler and strung out along the line. Stakes were driven into the sediment to temporarily identify 20 foot stations along the baseline. At each station a cross-sectional profile of the hull was determined using a high pressure water powered probe. Probing was initiated at every 20 foot reference station stake and carried beyond the confines of the hull at two foot intervals. At the aft extremity of hull structure additional probing was done to determine the condition of the hull and configuration of the stern. Once probing in the stern had been completed additional stations were probed forward of the engineering space. Initially, probing was carried out along the axis of the keel moving forward 20 feet from the forward face of the forward boiler. At the 40 foot station, probing failed to make contact with remains of the hull. This was also the case at the 60 foot station and probing along the keel was discontinued. Before

profiling the hull at the 10 and 20 foot stations could be accomplished, the tide and deteriorating sea state made work at the site impossible and the investigation was discontinued.

On 18 May, a second inspection of the remains of the IRON AGE was carried out to observe and record details of the exposed vessel structure. Buoys were placed on both the stern post and the boiler to assist in establishing the orientation of the hull and estimating the length of the vessel. Again the propeller shaft was used as a reference for establishing the positions of major features of the wreck and sketches were made to record their relationship. To facilitate identification of the wreck, a sample of ceramics, brass sheathing, fastners, and a shot were removed. The remains of a brass navigational lantern identified during the investigation were exposed but time did not permit recovery without the possibility of damaging the artifact so it was left in situ. Before halting the investigation the bottom in the vicinity of the wreck was examined in an effort to locate material associated with the ship. The search identified no additional material.

Immediately following investigation of the IRON AGE, a brief examination of the largest magnetic anomaly located on 17 May was carried out. Investigation of material exposed above the bottom surface identified the source of the anomaly as a walking beam engine. In addition to the walking beam, a cylinder, connecting rod, condenser, and one associated steam pipe were mapped and measured to produce a plan of the site that appeared to be the remains of the blockade-runner ELIZABETH. Probing in the immediate vicinity of the machinery confirmed the presence of additional material below the sediment surface. An examination of the bottom surrounding the exposed material failed to identify other wreck structure at the site and the examination was halted.

Personnel from the North Carolina Division of Archives and History's Underwater Archaeology Unit examined the site of the anomaly located 1200 feet south of the BENDIGO. Their investigation confirmed that no evidence of material generating the magnetic signature was exposed above the bottom surface. On-site activity was terminated to permit a planning meeting prior to continued investigation of the BENDIGO in the afternoon.

Following the planning meeting, an effort was made to resume probing of the forward section of the BENDIGO. Due to high winds and rough seas it was impossible to reposition the dive platform in the vicinity of the wreck site and the investigation was abandoned. These conditions continued throughout the following day precluding the possibility of completing the probing and field activity was concluded.

DESCRIPTION OF THE VESSELS AND TARGETS

BENDIGO Site

Vessel remains at the BENDIGO Site are those of an iron hull, paddle-wheel, steamer. An examination of exposed structure confirmed that the longitudinal axis of the hull lies on a magnetic bearing of approximately 130 degrees with the bow to the southeast. Forward of the engineering space the remains of the vessel are covered by sediment accumulations of more than ten feet. During periods when the channel migrated into the immediate vicinity of the wreck, the remains of the bow scour settled into the channel shoulder creating a break in the hull in the vicinity of the forward coal bunker. With the exception of a 10 by 10 inch structure that may have served as the support for a forward mast, no evidence of hull structure could be identified.

The engineering space amidships contains the remains of the vessel's boilers and steam machinery. The hull, reinforced to carry the weight of the machinery, and the machinery itself survives in a good state of preservation to the level of the main deck. Deck beams survive throughout the engineering space. Preservation of the hull structure is due at least in part to the depth of sediment surrounding the hull. The port paddle wheel and a portion of the paddle-wheel shaft outboard of the port steam cylinder have separated from the wreck and are no longer visible at the site. The starboard paddle-wheel hub, lower spokes, bucket mounts, and the remainder of the shaft survive intact supported by stanchions and the rods that connect the shaft to the air pumps and oscillating steam cylinders located below. Pillow block bearing caps on the shaft have been removed. Measurement of the hull immediately forward of the aft boiler produced a beam of 20 feet 2 inches. Paddle boxes 8 feet in width increased the maximum beam of the vessel to 36 feet 2 inches. Remains of the starboard paddle-wheel confirmed that the diameter of the wheel was 14 feet and buckets were 5 feet in length. No evidence of a feathering mechanism was observed but only a limited amount of the extremities of the wheel assembly were exposed (Figure 3).

Forward and aft of the steam machinery, the remains of the vessel's two boilers are exposed. Plating on the 8 foot 5 inch by 4 foot 10 inch steam chambers has deteriorated but frames survive to preserve evidence of design and construction. The boilers were covered by sediment to the base of the steam chamber but a length of 8 feet 8 inches and a width of 8 feet was determined by washing sediment out around the aft boiler. The top of each steam chamber was constructed to provide a 2 foot 4 1/2 inch diameter exhaust for the smoke pipes. Coal bunkers were constructed between the boilers and the hull on both the port and starboard sides of the ship.

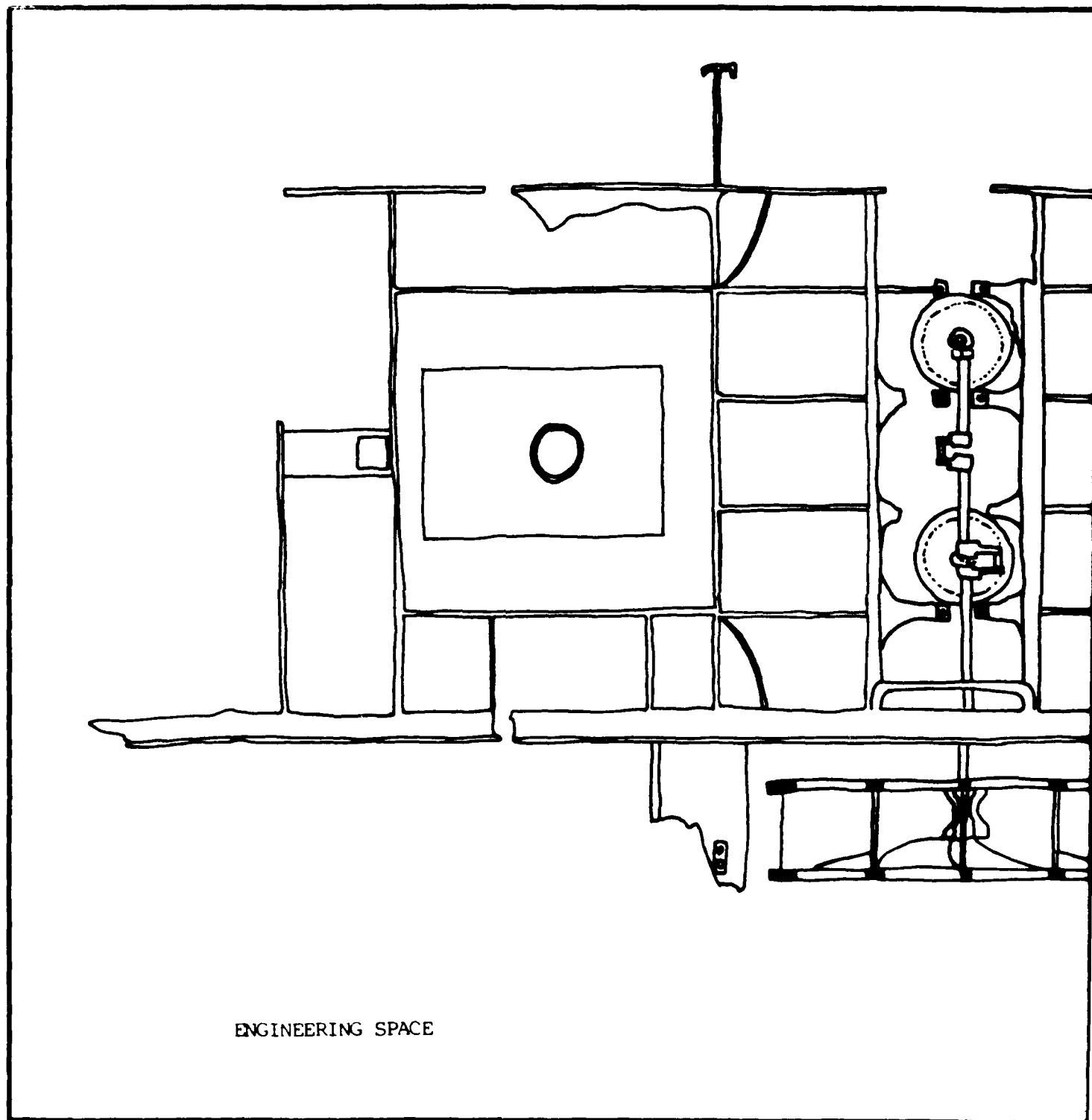
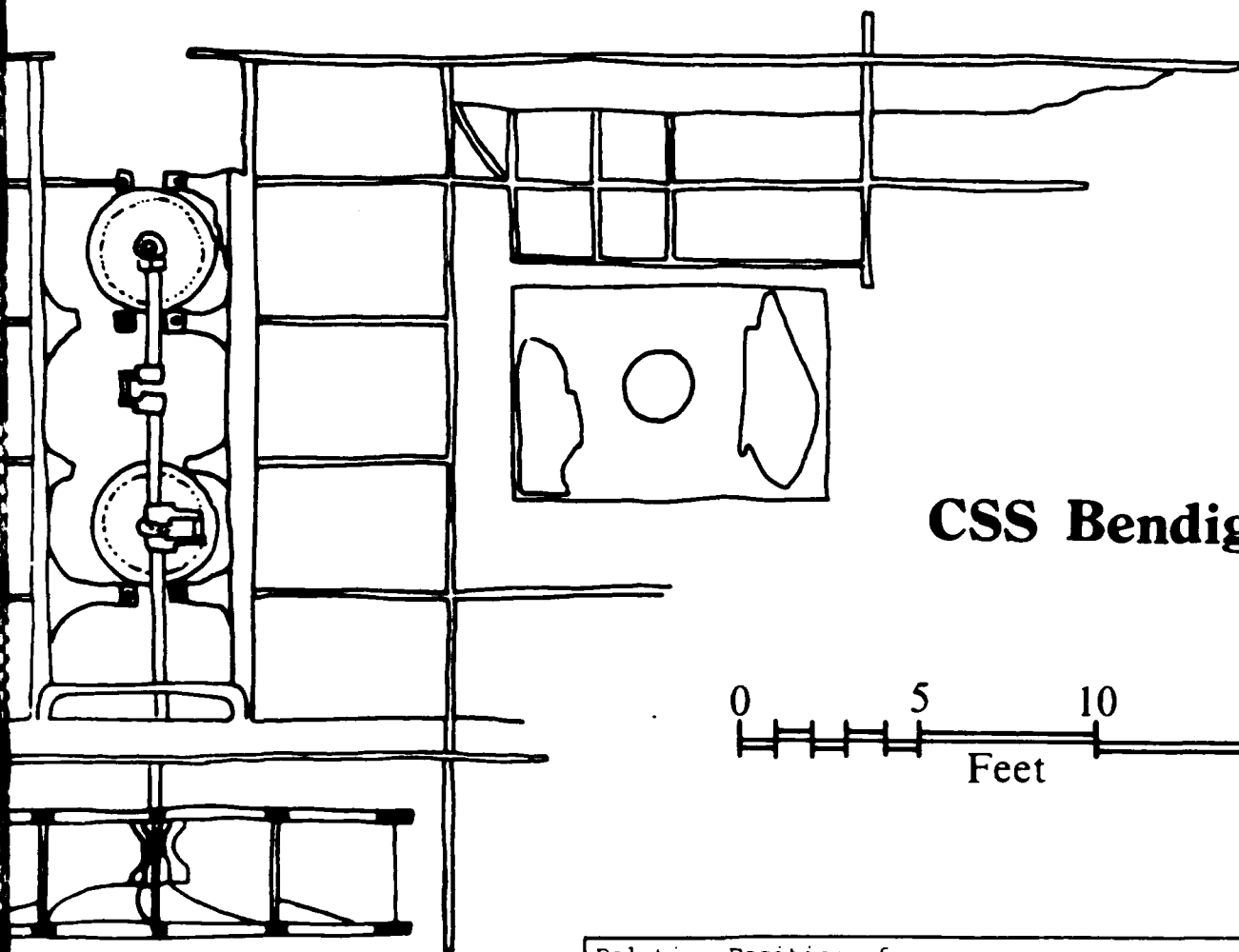


Figure 3, Exposed vessel remains at the BENDIGO Site.

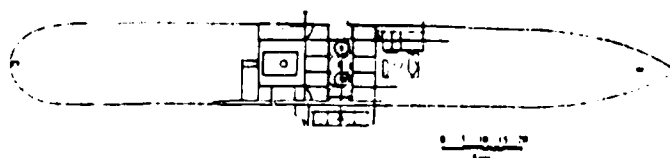


CSS Bendigo



Relative Position of
Exposed Vessel Remains

BENDIGO



Aft of the engineering space shoal sediment covers most of the hull structure. Although probing confirmed that much of the hull survives intact to the level of the deck, examination of the structure was not possible. Only the rudder quadrant located 63 feet aft of the after boiler was exposed above the bottom surface. Probing in the vicinity of the exposed quadrant confirmed that hull structure terminated at a point immediately aft of the quadrant (Figure 4).

Specifications for the vessel developed from survey data include a length between perpendiculars of approximately 176 feet, a displacement hull beam of 20 feet 2 inches, a maximum beam of 36 feet 2 inches, and a depth of hold of 10 feet. Draft calculated from these dimensions might be expected to be in the vicinity of 7 feet.

IRON AGE Site

Vessel remains at the IRON AGE Site are those of a wood hull, screw steamer. An examination of exposed structure confirmed that the longitudinal axis of the hull lies on a magnetic bearing of approximately 130 degrees with the bow to the southeast. Forward of the engineering space, the remains of the ship are covered by sediment accumulations associated with shoals that define the eastern side of the Lockwoods Folly Inlet navigation channel. No evidence of the forward section of the hull was exposed.

The engineering space amidships contains the remains of the vessel's boiler and steam machinery. Although extensively damaged, the boiler could be identified as one of the rectangular horizontal fire tube type and was constructed entirely of iron. The position of the smoke pipe exhaust suggests that the boiler now lies on its starboard side with much of the port side missing. Aft of the boiler the remains of a single cylinder vertical operating steam engine were observed. The major supports for the engine have collapsed and the rod with piston attached lies on a bed of coal and debris slightly to port and aft of its original position amidships. The steam cylinder lies further aft and extends from a position near the port side to a point near the propeller shaft. The propeller shaft, approximately eight inches in diameter, runs aft from the base of the engine to the sternpost and propeller. The four bladed iron propeller remains in position aft of the sternpost and is partially concealed by the remains of the brass sheathed wood rudder.

Aft of the engineering space the remains of the hull have been destroyed to a point immediately above the turn of the bilge. Along the turn of the bilge, oak frames, oak exterior planking, and bilge ceiling, possibly of pine, were found exposed permitting an estimate of the room and space to be made. Frames were found to measure eight inches moulded and nine inches sided with the room of similar dimensions. As the hull narrowed toward the stern, more of the structure was found intact. From a point approximately 20 feet forward of the stern post, the hull gradually rose to a height of

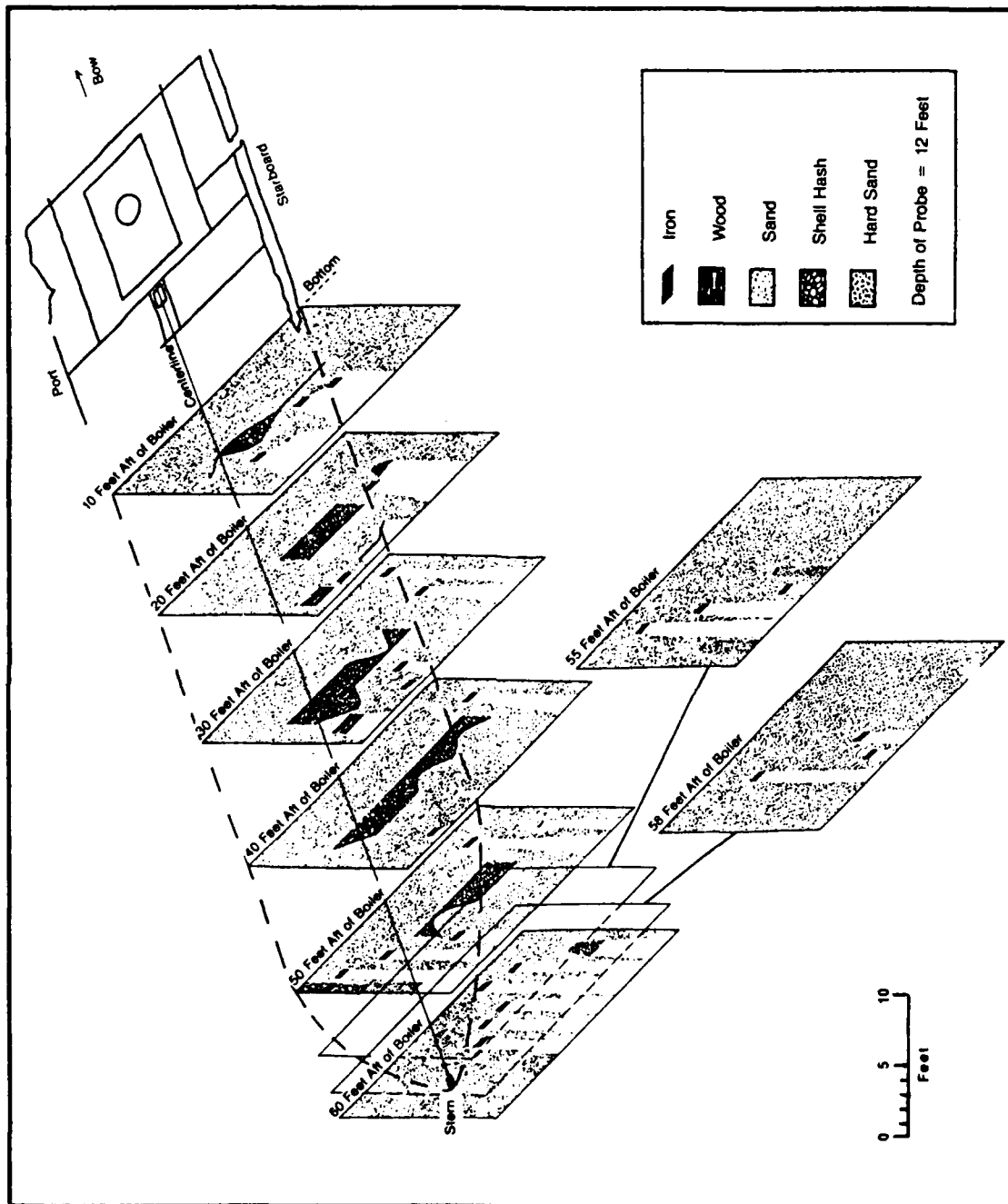


Figure 4, Profiles of the BENDIGO SITE

seven feet above the bottom sediment at the sternpost. Copper sheathing was found attached to the exterior of the hull by one and one-half inch brass sheathing tacks. Planking was secured to the frames with both bronze spikes and trunnels. The pattern of the fasteners was impossible to reliably determine because of the sheathing obscuring the exterior of hull structure exposed above the bottom sediment.

Inside the confines of the hull, sediment and material associated with the ship were found to exist to a depth of approximately three feet. In the vicinity of the boiler a number of round fused shot were observed amid modern debris used in anchoring small vessels in the inlet. In the vicinity of the machinery, steam pipes, ventilators, and pumps were found amid anthracite coal spilled from bunkers located aft of the engineering space. In the vicinity of the steam cylinder, the remains of a brass navigation lantern were found. Exposed portions of two additional lanterns were observed in the vicinity of the propeller shaft approximately 20 feet forward of the sternpost. A small excavation in the vicinity of the first lantern exposed fragments of both ironstone china and an earthenware jug. Fragments of dark green bottle glass were also visible in the vicinity of the excavation (Figure 5).

No evidence of additional material was found outside the confines of the hull along the starboard side of the ship. However, along the port side of the hull both ship structure and artifacts were observed. Near the stern, material included fragments of the hull structure, fastenings, sheathing, sheathing tacks, ceramic fragments, and large iron castings associated with the steam machinery.

ELIZABETH Site

Vessel remains at the ELIZABETH Site are those of a "walking beam" steamer. An examination of the exposed structure confirmed the presence of a 20 foot long walking beam, piston rods, cylinder, condenser, the air pump cylinder, and steam exhaust pipe. The walking beam was found partially exposed. The top of the beam protruded above the sediment at an angle of approximately 25 degrees and was observed to be oriented roughly east/west. The east end of the beam remained connected to dual 9 foot long rods which extended east to the top of the cylinder. Attached to the north side of the cylinder was a five foot long chest for the exhaust steam. At the base of the steam cylinder the remains of a condenser were visible. Between the cylinder and the walking beam, the remains of the air pump were observed along with a section of lead steam pipe that remained attached to the cylinder (Figure 6).

No evidence of the ship's boiler or remains of the hull structure were found although the area around the steam machinery was systematically searched and randomly probed to a depth of three feet. The investigation identified no artifacts associated with the wreck.

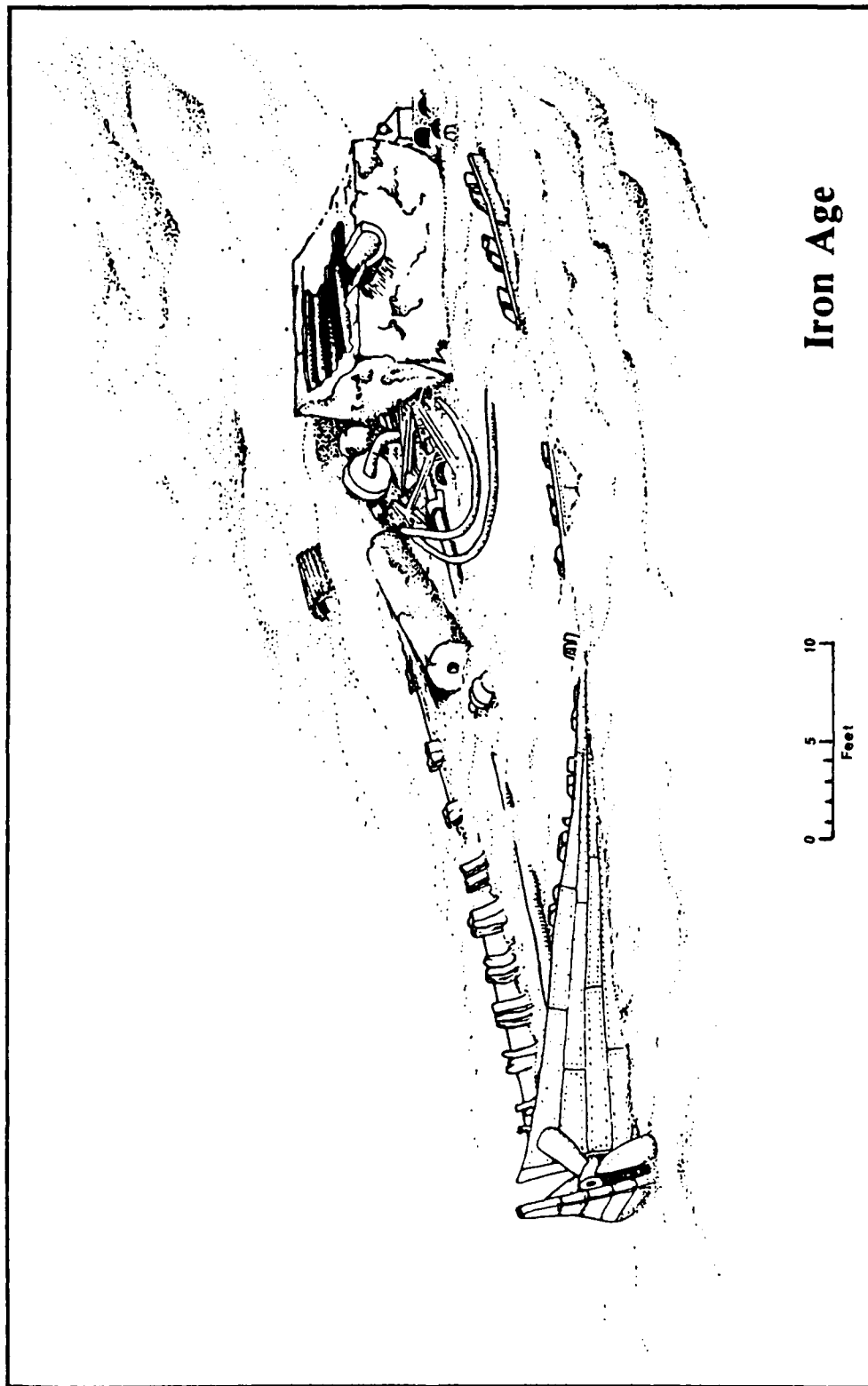


Figure 5, Vessel remains at the IRON AGE Site

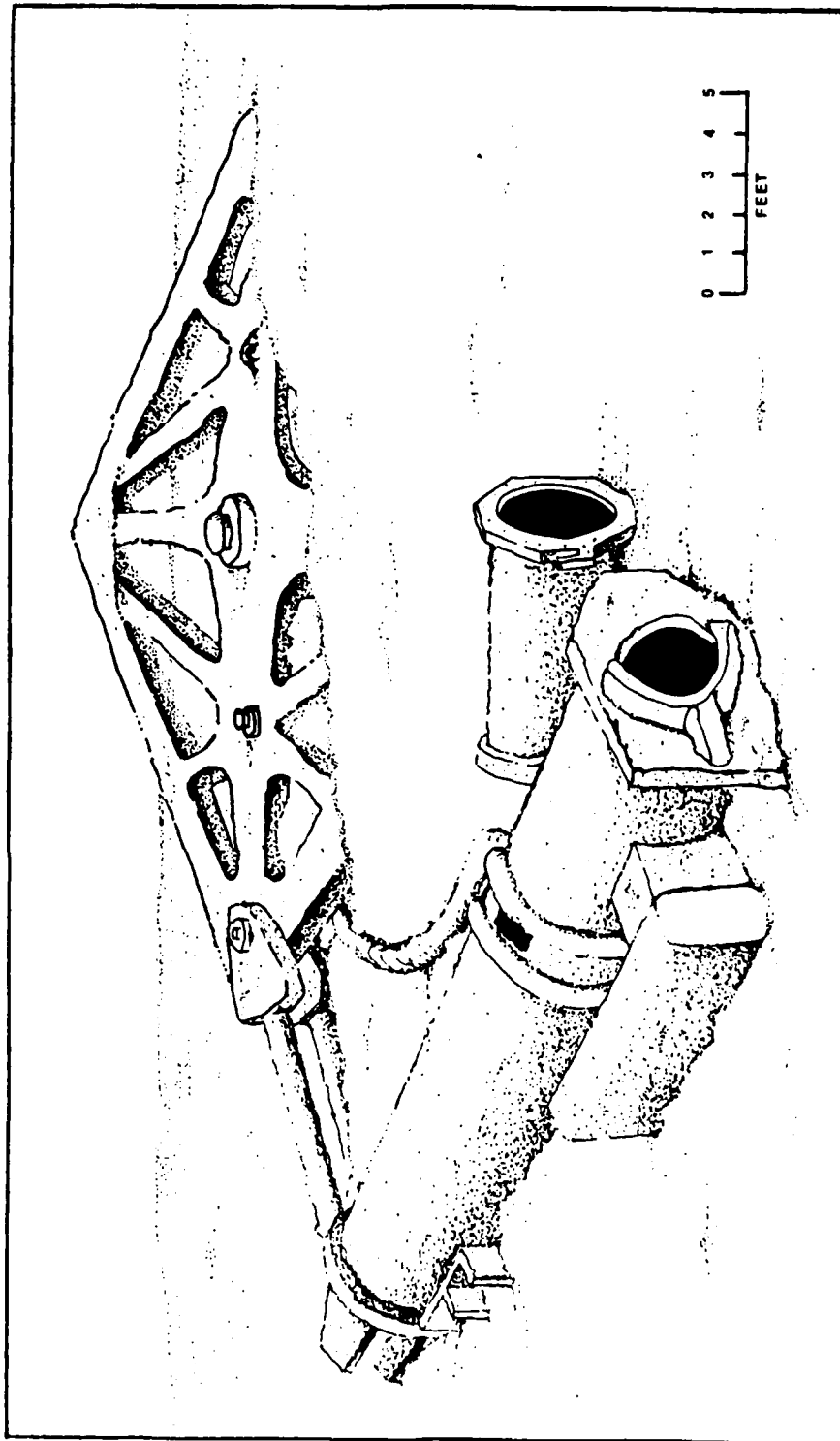


Figure 6, Vessel remains at the ELIZABETH Site

TARGET A

No evidence of exposed cultural material was identified by examination of the bottom surface at Target A.

TARGET B

No evidence of exposed cultural material was identified by examination of the bottom surface at Target B.

MODERN WRECK Site

Vessel remains at the MODERN WRECK Site 400 feet southeast of the BENDIGO Site were found to be those of a modern wreck. An examination of exposed structure confirmed the presence of two electrically welded steel fuel or water tanks, modern red and black high pressure rubber hose, iron pipe and angle iron frames.

WRECK SPECIFIC IDENTITY

In considering the identity of the three steamers examined during the investigation of shipwrecks at Lockwoods Folly Inlet, it is necessary to examine both the historical and archaeological evidence. Data from both historical and archaeological research provides considerable insight into the ship specific identity of the vessels. This evidence confirms the traditional identification of two of the wrecks and supports identification of the third.

Historical data preserved in the Official Records of the Union and Confederate Navies confirms that three steamers were lost at Lockwoods Folly Inlet during the American Civil War. These vessels are specifically identified as the ELIZABETH, the BENDIGO, and the USS IRON AGE. The first of these to be lost was the ELIZABETH, formerly the ATLANTIC, owned by the Southern Steamship Company and confiscated at New Orleans in January 1862. The ship was a wood hull steamer constructed in New York in 1852 by William Collyer. The 216 foot long, 28 foot beam hull was fitted with a vertical-beam condensing engine and two fire-tube boilers supplied by Morgan Iron Works and Quinpard Merrit and Company, both of New York. After Confederate agents in New Orleans determined that the ship would not be suitable for fitting out as a cruiser, the vessel was sold and privately operated as a blockade runner.

Under the command of Captain Thomas Lockwood, the ELIZABETH left Nassau on 19 September 1863 with a cargo of steel and saltpeter for Wilmington. Just twelve miles from the protection of Fort Caswell and the mouth of the Cape Fear River the ELIZABETH grounded on a shoal at the mouth of Lockwoods Folly Inlet. Finding it impossible to get the ship free, Captain Lockwood ordered the vessel burned on the morning of 24 September.

The wreck of the ELIZABETH contributed directly to the loss of a second steamer in January 1864. On the third of January the USS FAHKEE discovered a vessel ashore at the entrance to Lockwoods Folly Inlet. Inspection of the ship confirmed that the vessel was a blockade runner which had been fired and abandoned after being unloaded through the surf. The steamer proved to be the iron, paddle-wheel BENDIGO identified in a series of dispatches from the U.S. Consul in Liverpool, England. In a report dated 25 January 1864, Rear-Admiral S.P. Lee suggested that the BENDIGO's crew had mistaken the remains of the ELIZABETH for a blockader and run ashore in an attempt to slip between the wreck and the beach.

Being unable to get the BENDIGO off the shoal due to the presence of Confederate artillery and infantry on shore adjacent to the wreck, Rear-Admiral Lee ordered the vessel destroyed. Although the destruction of the wreck was reported to Lee on the morning following, on his order several vessels were engaged in attempting to refloat the BENDIGO on 9 January 1864. While assisting the U.S.S. MONTGOMERY in this operation, the U.S.S. IRON AGE grounded near the BENDIGO on 10 January. When efforts to refloat the IRON AGE also failed the vessel was set afire and destroyed by an explosion on the following day.

This activity contributed to the loss of a third blockade runner. Shortly after the IRON AGE was blown up, a vessel was sighted beached and burning less than a mile west of Lockwoods Folly Inlet. The ship proved to be the new, iron, paddle-wheel steamer RANGER. No doubt trapped by the vessels attempting to save the IRON AGE, the RANGER had been run aground and set afire to avoid capture. Efforts to save the RANGER were equally unsuccessful and the ship was shelled to complete destruction of the hull and machinery.

From an historical perspective, this confirms the loss of three vessels at Lockwoods Folly Inlet and a fourth less than a mile to the west. Identification of each of the vessels can reliably be made by comparing design and construction details preserved in the historical records with features observed at the four wreck sites.

Although the remains of a vessel's steam machinery proved to be the only exposed structural evidence at the ELIZABETH Site, the engine type corresponds with that installed in the ATLANTIC by Morgan Iron Works. William Collyer purchased a vertical beam condensing engine and two tubular boilers for the ATLANTIC in 1852. In addition to the similarities in steam machinery, several other factors suggest that the ELIZABETH Site vessel is the ATLANTIC. The absence of exposed hull remains at the site could be due to both the fact that the ship was burned after grounding and the deterioration and collapse of a wood structure which, unlike iron does not survive long when exposed in the water column. The intensity of the magnetic signature generated by material at the site was found to exceed that normally anticipated in association with wood hull remains and steam machinery.

It is possible that the strength of the signature is a factor of the steel identified as cargo on the ELIZABETH. Finally, the location of the wreck, east of the BENDIGO, can be considered in keeping with the suggestion that the BENDIGO was run ashore after mistaking the remains of the ELIZABETH for a blockader. This would make little sense if the remains of the ELIZABETH were west of the remains of the BENDIGO.

The traditional identification of the steamer on the shoal west of the Lockwoods Folly Inlet navigation channel appears to be correct. Both the historical and archaeological evidence support identification of the wreck as the remains of the BENDIGO. The U.S. Consul in Liverpool described the BENDIGO as a topsail yard schooner-rigged steamship of 178 tons and:

"...built of iron, hull painted green; three portholes each side, fore and aft of the paddle boxes. Elliptic stern, carvings, and name on same, painted white, ***; bridge athwartships on top of paddle boxes; after funnel or smokestack, with steam pipe fore part of same, fire funnel or smokestack with steam pipe fore part of same ***; draws 8 feet 6 inches aft and 8 feet forward."

Examination of the wreck confirms that the ship was an iron hull, paddle-wheel steamer containing two boilers, one forward of the engineering space and a second immediately aft. This would produce the type of smokestack plan discussed in the consular dispatch cited above. The tonnage estimated in that same dispatch conforms to estimates produced by calculating the tonnage of the wreck based on dimensions secured at the site and the formula identified in the Treatise on Iron Shipbuilding published by William Fairbairn in 1865. The results of those calculations appear in the enclosed tables. The depth of hold of the wreck measured by probing confirms a draft of approximately eight to nine feet. The fact that little evidence of cargo was found by probing supports the historical evidence that the ship was almost completely unloaded before Union vessels discovered the BENDIGO. The fact that the site lies to the west of the remains of the ELIZABETH is in keeping with the hypothesis that the BENDIGO was run ashore attempting to pass between the wreck and the shore. Finally, the east/west orientation of the hull is in keeping with the eastward direction of the BENDIGO at the time that the ship ran aground.

The traditional identification of the steamer on the shoal east of the Lockwoods Folly Inlet navigation channel also appears to be correct. Both the historical and archaeological evidence support identification of the wreck as the remains of the IRON AGE. Enrollment papers for the IRON AGE confirm that the ship was a screw steamer of 424 tons fitted out to serve on the blockade. The remains traditionally

identified as the IRON AGE are those of a wood-hull, screw propeller. The dimensions of the hull remains conform to the beam specified on the enrollment document and the length estimate of 140 feet is in the vicinity of the 144 foot length cited in that same document. Although no evidence of the ship's ordnance was found during the survey, the presence of numerous eight inch shot fitted with U.S. Ordnance Department fuses can be considered supportive of the IRON AGE identification of the wreck. A brass navigation lantern recovered from the site was produced by William Porter, a New York contractor that supplied lanterns for other U.S warships including the U.S.S. MONITOR. Brass sheathing on the hull of the vessel is typical of precautions taken by the U.S. Navy to protect vessels in southern waters from teredo worm damage. Finally, the location and orientation of the remains of the vessel add credence to the identification of the wreck as the IRON AGE. The ship lies less than a cable length (720 feet) from the iron hull paddle wheel steamer identified as the BENDIGO. The axis of the hull is identical to that of the BENDIGO with the stern oriented toward that vessel's bow. This position conforms to what might be anticipated given the historically documented fact that the IRON AGE was employed in attempting to free the stranded BENDIGO when a cable slipped and the Union warship also grounded.

While this identification of the wrecks is based on limited investigation of the sites, the evidence is strongly supportive of the conclusions. Only the ELIZABETH was known to be equipped with the earlier walking beam form of steam machinery. The IRON AGE, while also a wood hull, had been fitted with a screw propeller. The only vessel of the three to have been constructed of iron was the BENDIGO. Because of the historic location of the RANGER west of the inlet and the physical dimensions of the vessel that have been confirmed through historical and archaeological research, there is little chance of confusing it's identity with remains of the IRON AGE, BENDIGO, or ELIZABETH.

SECTION 4 - SIGNIFICANCE AND RESEARCH POTENTIAL

IMPLICATIONS OF HISTORICAL RESEARCH

Historical research initiated to identify the Carolina Beach Inlet and Lockwoods Folly Inlet shipwrecks was expanded to generate insight into the significance and research potential of the wreck sites and assist in determining appropriate measures for mitigation should the sites be threatened by channel maintenance activities. To date the research has confirmed the existence of extensive historical source materials. Many of these have not been previously examined and most have never been considered in determinations of shipwreck significance and research potential. The data identified in these sources shed new light on both the vessels involved in blockade running, the cargoes carried by blockade runners, and the activities of those engaged in various aspects of the trade.

The Civil War is perhaps the most well documented period in American history and secondary source treatments are extensive. The examination of secondary historical sources carried out in conjunction with this investigation of Lockwoods Folly Inlet shipwrecks confirmed the extensive nature of this data. While naval and maritime activities have not received attention in proportion to their impact on the Civil War, primary record sources preserve an extensive and frequently untapped potential for research.

Bibliographies of Civil War publications proved to be of considerable assistance in identifying sources of material. American Civil War Navies: A Bibliography produced by Myron J. Smith, Jr.; Robert G. Albion's Naval and Maritime History-A Bibliography; Paolo E. Coletta's A Bibliography of American Naval History (1981); Nevins and Robertson's The Civil War: A Bibliography (2 vols.); C. R. Schultz, Bibliography of Maritime and Naval History, Periodical Articles published since 1970; and a variety of bibliographies published in Civil War History, Journal of Southern History, and Journal of American History provide excellent insight into available materials.

Excellent general treatments of the American Civil War naval activity were found in the works of such authors as Alan Nevins, Frank L. Owsley, Bruce Catton, Philip Van Doren Stern, and Berne Anderson. More specific data concerning naval and maritime activities was identified in such sources as Thomas J. Scharf's History of the Confederate States Navy: From Its Organization to the Surrender of Its Last Vessel, James R. Soley's The Blockade and the Cruisers, and Francis Bradley's Blockade Running During the Civil War. Finally, highly specific secondary source data was found in a variety of published and unpublished secondary sources. The Civil War Naval

Chronology published by the United States Navy, Great Britain and the Confederate Navy 1861-1865 written by Frank J. Merli, Samuel B. Thompson's Confederate Purchasing Operations Abroad , Richard C. Todd's Confederate Finance , and James D. Bullock's Confederate Secret Service in Europe .

Published primary sources range from the Official Records of the Union and Confederate Navies in the War of the Rebellion (31 vols.) and The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies (128 vols.). Dozens of articles and essays concerning maintaining and running the blockade can be found in Battles and Leaders of the Civil War (4 vols., 1887) and many of those involved in civil war maritime and naval activities published personal accounts of their involvement. Among the more important accounts of Union naval officers are Reefer to Rear Admiral (1899) written by Benjamin F. Sands, Three Years on the Blockade: A Naval Experience (1902) by Israel E. Vail, Memoirs of Paul Henry Kendrick (1910), Autobiography of Rear Admiral Charles Wilkes (1978); William F. Keeler's Aboard the U. S. S. FLORIDA (1864); John M. Britten, Reminiscences of Two Years in the United States Navy (1881); and John D. Hayes (ed.), Samuel Francis DuPont: A Selection from his Civil War Letters (3 vols., 1969). Accounts of blockade running can be found in Augustus Charles Hobart-Hampden, Hobart Pasha (1915); Thomas E. Taylor's Running the Blockade (1896); and William Watson's The Adventures of a Blockade Runner; or, Trade in Time of War (1892).

Contemporary newspapers and magazines are most important sources for the blockade. Southern port newspapers such as the Wilmington Journal and Weekly Journal ; the Charleston Courier and Mercury ; the Savannah Republican and Morning News , and the Mobile Advertiser and Register all carried information on blockade running include cargoes and lists of blockade running in port. Union newspapers particularly those such as the New York Herald and Tribune that sent correspondents along with the blockading squadrons carried frequent stories of blockade activities. British ports papers such as The Times (London), and the Liverpool papers carried a surprising amount of information on blockade running. Even the Bermuda Gazette is an important source. Finally, Harper's Weekly as well as British publications such as Engineering and Artizan carried articles on the blockade and blockade runner.

Available unpublished sources are voluminous. They range from manuscript collections in state historical societies, state libraries and archives, university libraries, private libraries such as the Huntington Library in California. They include correspondence, diaries, and other papers of naval officers, individuals and business firms engaged in blockade running, Confederate officers and officials and their activities related to blockade running, and even official records (Union, Confederate and state). There are numerous published and unpublished guides to these collections. The most comprehensive

(but by no means complete) guide to manuscript collections is the Union Catalog of Manuscript Collections published annually since 1958 by the Library of Congress. It covers virtually all repositories in the United States.

The National Archives in Washington, D.C., is perhaps the most important single repository of unpublished materials related to the blockade. It includes thousands of cubic feet of official records of the Union Navy, Army, Treasury Department, captured Confederate records, logbooks of blockaders and blockade runners, plans and drawings of blockaders, and some private papers. It also houses unpublished records of the Army Chief of Engineers (Record Group 77). The Army Corps of Engineers had the responsibility in the post Civil War years of clearing the rivers, harbors, and inlets in the former Confederate states of obstructions to navigation, including blockaders and blockade runners.

The Guide to the National Archives of the United States (1974) provides the best introduction to these records. It gives brief descriptions of all record groups (i.e. records of the Navy Department, etc.). The National Archives has also published two volumes that give more information on Civil War records: Guide to Federal Archives Relating to the Civil War (1962); and Guide to the Archives of the Confederate States of America (1968), both compiled by Henry P. Beers. There are several hundred different "record groups" and each of them has a published or unpublished inventory. An important one on the blockade is List of Logbooks of U.S. Navy Ships, Stations, and Miscellaneous Units, 1801-1947. (Special List 44, 1978). Finally, the National Archives has published microfilm editions of their records, many of which relate to the blockade. For example, Letters Received by the Secretary of the Navy from Commanding Officers of Squadrons includes extensive data on the various blockading squadrons. For a catalog of available microfilm see National Archives Microfilm Publications (1985).

Regional record centers of the National Archives exist in Boston, Bayonne, Philadelphia, Atlanta, and Leavenworth, Kansas. Collections held by the regional record centers include one of the most valuable, yet virtually unused, sources of information concerning blockade running. While most of the collections are referenced only by vessel name and have not been properly indexed, the records of the New York Prize Court have been examined and documented by Madeline R. Robinton in An Introduction to the Papers of the New York Prize Court, 1861-1865 (1945). Robinton's work provides an insight into the nature and scope of information contained in these important collections. A typical record set might contain a detailed and certified cargo manifest, frequently prepared to facilitate auction of the goods. Information about the ship often survives in records associated with the survey of the vessel carried out to facilitate auction or purchase of the ship by the United States Navy. To insure that the crew of

each prize was properly interrogated, an inquiry form containing a standardized series of questions designed to produce intelligence concerning the activities of the captured vessel and others operating out of the same ports, had to be filed for each prisoner. Captured ship's papers frequently included the vessel's log, enrollment and registry, manifest, accounting disbursements, certificates of the ship's officers, and roster of the crew. Navigational charts and copies of regulations that governed shipboard life were occasionally included among newspapers, mail, personal receipts, invoices, and diaries held as evidence. With 198 cases adjudicated in New York alone, these court records may well represent the largest collection of blockade running material available for investigation outside investigation of shipwreck resources (Robinton 1945).

The Library of Congress also contains an important historical sources of Civil War material. In addition to the most complete collection of newspaper sources, cartographic references, and photographs, the collections of the Library of Congress contain extensive manuscript resources. Civil War Manuscripts: A Guide to Collections in the Manuscript Division of the Library of Congress has been compiled by John R. Sellers and published by the U. S. Government Printing Office (1986). The guide lists and describes hundreds of contemporary primary source collections associated with the Civil War.

In North Carolina, the North Carolina State Archives in Raleigh and the libraries of the University of North Carolina at Chapel Hill and Duke University contain material associated with Civil War naval and maritime activity. State records associated with blockade running are preserved in a variety of collections including the papers of Governor Z. B. Vance. Other material can be found in collections identified in a Guide to Private Manuscript Collections in the North Carolina State Archives compiled and edited by Barbara T. Cain and published in 1981 by the North Carolina Department of Cultural Resources. Holdings of Duke and the University of North Carolina Southern Historical Collection include extensive personal and family collections.

Material on vessels lost in North Carolina can also be found in several South Carolina repositories. The South Caroliniana Library in Columbia contains more than a dozen collections of papers relating to the blockade and blockade running in North Carolina. In Charleston, the collections of the South Carolina Historical Society contain collections associated with some of the most prominent and successful blockade running operations.

Initially documented in 1947 by Frank E. Vandiver, the collections of the Bermuda Archives contain excellent manifest records on blockade runners operating through Bermuda. The Custom House records from St. Georges and Hamilton provide excellent documentation of cargos trans-shipped through the Crown Colony's ports. Additional material can be found in the St. Georges Historical Society collections and

those of the Confederate Museum in St. Georges. The newspaper holdings of the Bermuda Archives include the Royal Bermuda Gazette which contains a wealth of material on "the trade."

In Great Britain considerable information is preserved in collections held by the National Maritime Museum in Greenwich. In addition to plans identified in an inventory of ship draughts prepared by D. J. Lyon as the "Denny List", the museum contains models and paintings of vessels associated with the American Civil War. The manuscript collections of the National Maritime Museum have been cataloged by R. J. B. Knight in a two volume Guide to the Manuscripts in the National Maritime Museum (1977 and 1980). Volume I contains "The Personal Collections" while Volume II treats "Public Records, Business Records, and Artificial Collections." Shipping: A Survey of Historical Records edited by Mathias and Pearsall and published by the National Maritime Museum contains excellent information sources on shipping companies that sold vessels to blockade running interests.

The Public Records Office in Kew Gardens preserves an equally impressive amount of information on American Civil War vessels. Due to stringent control of shipbuilding in Britain all vessels were required to have Certificates of British Registry. These certificates record numerous details of design and construction as well as ownership. While these records preserve important information about vessels built and sold to run the blockade other official documents contain data from inspections and appraisals during pre-war careers in public steamship service.

Although manuscript guides are not available other British institutions and museums have valuable collections of material. The Science Museum of South Kensington maintains collections and paintings that are identified in a Handbook of the Collections Illustrating Merchant Steamers and Motor-Ships by H. P. Spratt. The two part catalog documents paintings and models of several vessels with Civil War connections. The "Catalogue of the Collection of the City of Liverpool Public Museums" prepared by E. W. Paget-Tomlinson documents numerous marine steam engine models that represent most of the types used in blockade runners. Both the Merseyside Maritime Museum in Liverpool and the Museum of Transport in Glasgow have collections that include both paintings and models of British ships associated with the American Civil War. The University of Glasgow manuscript collections include valuable material on companies and individuals involved in the construction of British built blockade runners.

On the basis of this research alone, it is apparent that additional historical research could shed new and important light on many of the research questions identified in the Cape Fear Civil War Shipwreck District nomination. Data on the nature and extent of military and civilian cargoes survives in a variety of sources. A review of the Wilmington Daily Journal and Weekly Journal confirms that detailed

cargo lists were published for vessels entering and leaving port as well as goods salvaged from vessels ashore. These accounts are augmented by additional material preserved in the collections of firms such as Frazier Trenholm and Company of Charleston and John T. Bourne in Bermuda. Extensive records of contraband cargoes are preserved in voluminous collections associated with adjudicated vessels captured running the blockade. These record sources are virtually untouched by historians. For military material, the correspondence and printed memoirs of Confederate and southern state purchasing agents provide invaluable insight.

Investigation of the historical records also confirms the availability of extensive records concerning the design and construction of vessels built for and sold to run the blockade. In an age in which engineers took an increasingly active role in ship design and construction, documentation increased dramatically. Plans for vessels engaged in blockade running survive in repositories in Europe and the United States. Patents, and professional publications document extensively the development of steam machinery and iron and steel vessel construction. The data preserved in both Engineer and Artizan, English engineering journals, serves as an excellent example of the amount of information preserved. During the second and third quarter of the 19th century mechanical engineering treatise were common and widely published. Record collections associated with the major shiphandling companies survive in European archival repositories.

CIVIL WAR SHIPWRECK SIGNIFICANCE AND RESEARCH POTENTIAL

Problem Areas

Determination of significance and assessment of research potential for shipwreck sites has generally been carried out on a vessel specific basis and generally as a response to one of a variety of threats to the resource. Those responsible for the protection and management of shipwreck archaeological sites are frequently put in the position of having to make decisions about site value as a reaction to rapid environmental changes, developmental pressures, channel or beach maintenance activities, salvage interests, looting, and on occasion proposals for scientific research. Unfortunately, most of these decisions are made without the benefit of an examination of the associated historical context or an assessment of the nature and scope of the data base.

With the apparent perception of "significance" accepted to identify all things which are "not significant", and vice versa, options have been polarized. The remains of vessels are consequently determined to be either "significant" and worthy of preservation or mitigation, or "not significant" and unworthy of the effort and expense. Decisions made working within this dichotomy, under the normal political pressure and without a supportive base of historical, archaeological,

and anthropological data frequently do not accurately reflect the real values of the resource, the interests of the historical, archaeological, anthropological communities, and the general public. Where mitigation is required, the research is often inappropriately conceived and ill suited to the real needs associated with the resource.

To improve the process for assessing research potential and site significance, criteria must be developed and utilized by responsible managers. This is an essential prerequisite for supporting those decisions and providing assurance that the limited resources available for protection, investigation, and development of shipwreck sites are not misappropriated for activities that will generate only nominal returns. Although most states with submerged cultural resource management programs have developed shipwreck files to assist in site identification and protection, few agencies have made a concerted effort to properly research vessels, categorize resources within an historical, archaeological, and anthropological context, identify criteria for assessing significance and research potential, and develop site protection and mitigation requirements that are reflective of established resource values.

In North Carolina, historical research and shipwreck investigations associated with the remains of vessels lost during the American Civil War have generated sufficient data to identify some initial considerations essential in developing significance and research criteria. Although much remains to be done, the research to date has identified a number of primary considerations. A brief synopsis of this research and an examination of these considerations can perhaps serve to focus attention on the problems of significance and research potential.

North Carolina Civil War Shipwreck Population

Naval and maritime activity played a decisive role in the conduct of Civil War activities in North Carolina. A unique coastal geography provided the environment for virtually every type of water-related military and civilian operation. As a result, the coastal and off-shore bottom lands of North Carolina contain the remains of more than 100 Civil War vessels. A preliminary inventory of Civil War shipwrecks provides an insight into the nature and scope of the resource base.

PRELIMINARY CIVIL WAR SHIPWRECK INVENTORY

VESSEL TYPE	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED IN N.C.
UNION MILITARY			
FIRST RATE			
steam frigate	1	0	0
ship	2	0	0
SECOND RATE			
steam screw	3	0	0
frigate	4	0	0
ship	2	0	0
THIRD RATE			
side-wheel steamer (iron)	1	0	0
side-wheel steamer (wood)	1	0	0
side-wheel steamer (wood/double end)	2	2	0
FOURTH RATE			
side-wheel steamer (iron)	2	0	0
side-wheel steamer (wood)	2	2	0
screw steamer (iron)	2	2	1
screw steamer (wood)	7	5	3
screw tug (iron)	7	0	0
screw tug (wood)	3	0	0
MONITORS	6	1	1
SUBMARINES	1	1	0
IRONCLAD STEAMER	2	0	0
COTTON CLAD STEAMER	1	0	0
TINCLAD STEAMER	2	0	0
TOTAL	51	13	5

AUXILIARY MILITARY SERVICE

VESSEL TYPE	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
sloops	3	0	0
schooners	32	3	0
barks	1	0	0
brigs	1	1	0
ships	3	0	0
canal boats	11	0	0
picket boats	1	1	0
mail boat	1	0	0
ferry	4	1	0
unidentified			
steamers	19	1	0
paddle-wheel			
steamer (wood)	3	3	1
paddle-wheel			
steamer (iron)	4	1	1
paddle-wheel tug			
(wood)	1	0	0
screw tug (wood)	4	0	0
stern-wheel			
steamer (wood)	4	0	0
screw steamer			
(wood)	2	2	1
screw steamer			
(iron)	4	1	0
TOTAL			
	98	14	3

STONE FLEET

VESSEL TYPE	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
bark	10	0	0
whale bark	5	0	0
ship	14	0	0
whale ship	7	0	0
TOTAL			
	36	0	0

UNION COMMERCIAL

VESSEL TYPE

	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
pilot boat			
(steam)	2	0	0
mail steamer	1	0	0
schooner	43	1	0
bark	27	0	0
whale bark	18	0	0
collier	2	0	0
brig	16	1	0
hermaphrodite brig	1	0	0
ship	37	0	0
whale ship	23	0	0
clipper	3	0	0
TOTAL	172	2	0

CONFEDERATE MILITARY

VESSEL TYPE

	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
SECOND RATE			
frigate	1	1	raised
THIRD RATE			
steam sloop	3	0	0
IRONCLAD RAM	18	4	2
COTTON CLAD	8	0	0
SCREW GUNBOAT			
(iron)	1	0	0
SCREW GUNBOAT			
(wood)	6	1	1
SCREW STEAMER			
(iron)	4	2	1
SCREW STEAMER			
(wood)	5	0	0
SCREW TUG			
(wood)	2	0	0
SCREW TORPEDO BOAT			
(wood)	1	0	0
SUBMARINE TORPEDO BOAT			
(wood)	1	0	0
SUBMARINE	1	0	0
TOTAL	51	8	4

AUXILLARY MILITARY SERVICE

VESSEL TYPE	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
steamer			
(unidentified)	46	4	1
paddle-wheel			
steamer (iron)	11	0	0
paddle-wheel			
steamer (wood)	40	3	0
lightship	1	1	0
floating battery	6	1	0
barge	4	0	0
sloop	7	0	0
schooner	63	10	0
bark	3	0	0
brigantine	1	0	0
ship	1	0	0
unidentified	12	0	0
TOTAL	195	19	1

CONFEDERATE COMMERCIAL

VESSEL TYPE	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
steamer			
(unidentified)	10	0	0
paddle-wheel			
steamer (iron)	31	15	9
paddle-wheel			
steamer (wood)	12	3	2
screw steamer			
(iron)	11	8	6
sloop	28	0	0
schooner			
(center board)	1	0	0
schooner	80	23	3
bark	4	2	0
brig	1	1	0
ship	2	1	0
unidentified	2	2	0
TOTAL	182	55	20

SHIP LOSSES

	TOTAL LOST U.S.	TOTAL LOST N.C.	TOTAL LOCATED/EXAMINED
RESOURCE BASE %	786 100%	113 14%	34 4.2%

This shipwreck population, exclusive of those wrecks recovered or destroyed by post war salvage activities, includes thirty-four of the approximately eighty-five categories of Union and Confederate vessels lost during the war (Shomette 1973). Of the approximately 185 Union naval and military vessels lost, a total of 29 were sunk in North Carolina waters. More than 246 Confederate naval and military vessels were also lost during the conflict. Of those, 27 have been determined to be in North Carolina. Out of approximately 182 ships lost while engaged in Confederate associated maritime commerce, at least 55 are known to have been sunk in North Carolina. In sharp contrast, only 2 vessels out of the more than 172 lost in carrying on Union commercial activity were lost in the state. In rough figures, the Civil War shipwreck population of North Carolina contains approximately 14% of the total Civil War shipwreck data base. Of these wrecks, approximately 30% have been located and to varying degrees examined.

NATURE OF PREVIOUS INVESTIGATIONS

Although only a portion of previous work has been carried out in accordance with archaeological standards, all of the activity has resulted in the generation of data concerning Civil War shipwreck sites. Initial interest in Civil War shipwrecks was generated by the discovery and subsequent salvage of the blockade runner MODERN GREECE. Through the office of the Governor, the North Carolina Division of Archives and History obtained assistance in salving the cargo and a variety of material associated with the ship structure (Bright 1977).

Interest generated by activities associated with the MODERN GREECE resulted in the location and investigation of at least ten other Civil War vessels. Investigations of these wrecks concentrated on identifying their location, conducting a preliminary assessment of the condition of the wreck, and recovering material from the sites for displays associated with the Civil War Centennial celebration. That celebration and the recovery of material from the blockade runners stimulated interest in the recovery and display of the remains of the Confederate ironclad C.S.S. NEUSE (Bright 1981).

The activities of Underwater Archaeological Associates, Inc., a non-profit group formed to investigate the remains of North Carolina shipwrecks, produced additional information concerning Civil War vessels. Operating in the early years of the 1970's, the group explored the remains of blockade runners lost in the vicinity of the Cape Fear south of Wilmington. For the first time, an effort was made to recover both material preserved at a site and the associated archaeological record (Watts and Bright 1973).

In conjunction with these and other activities, the North Carolina Division of Archives and History was able to develop an in-house underwater archaeological research capability. The passage of

protective legislation in 1967 confirmed State ownership of submerged cultural resources and delegated management authority to the Division of Archives and History. By 1971, funding was approved for a professional staff to manage the underwater archaeology program and expand research associated with shipwreck site location, identification, and investigation. By developing cooperative research projects with other state agencies, educational institutions, and historical societies, the Underwater Archaeology Branch was able to significantly increase the number of known Civil War shipwreck sites and refine data about previously identified vessels (Watts and Bright 1973, Watts et.al., 1975).

In 1974, the Underwater Archaeology Branch of the North Carolina Division of Archives and History initiated a field school program with the University of North Carolina at Wilmington. During three summers of field activity, Civil War shipwrecks in the vicinity of Cape Fear were investigated. Remote sensing surveys were carried out in portions of the nearshore waters between New Inlet and New Topsail Inlet. On-site reconnaissance surveys were carried out on the remains of six blockade runners, and more detailed examinations and recovery projects were conducted at the site of the USS PETERHOFF, nominated to the National Register of Historic Places in 1974, and SOPIHA.

As a result of these investigations and Federal pressure to nominate sites to the National Register of Historic Places, the Underwater Archaeology Branch investigated the concept of nominating Civil War shipwrecks of the Lower Cape Fear as a district. However, before the concept could be fully developed, research and management priorities shifted away from the Cape Fear region. With the exception of random on-site examinations, a remote sensing survey carried out off shore of Fort Fisher, and remote sensing reconnaissance surveys of Civil War vessels in the Cape Fear River, wrecks of the period and the district nomination received little attention until the environmental review process began to focus attention on sites subject to developmental impact. The blockade-runner BENDIGO became the center of a disagreement between the Division of Archives and History and the United States Army Engineer District, Wilmington. In 1984, the Underwater Archaeology Unit resumed work on the Cape Fear Civil War Shipwreck District nomination and in 1986 the nomination was approved.

As a result of cooperative investigations and the development of management guidelines for submerged cultural resources, the Wilmington Corps of Engineers and the Underwater Archaeology Unit resumed investigation of Civil War shipwrecks in areas subject to the environmental review process. Within the past two years shipwreck site location and assessment surveys associated with channel maintenance activities of the Wilmington District United States Army Corps of Engineers have generated additional information concerning Civil War shipwrecks in the Cape Fear region. In 1983, investigation of the remains of two vessels in the vicinity of Carolina Beach Inlet

led to their identification as Civil War blockade runners (Watts 1984). The following year the remains of the Lockwoods Folly Inlet vessels were investigated. As documented in this report, examination of exposed hull structure at each site and historical research confirmed that two of the vessels were the remains of blockade runners and the third was identified as a Union gunboat.

CRITERIA FOR SIGNIFICANCE AND RESEARCH POTENTIAL

Establishing the significance and research potential of shipwreck sites under investigation at Carolina Beach and Lockwoods Folly has provided an opportunity to examine both the nature and scope of information generated by twenty years of Civil War shipwreck investigation in North Carolina, and the historical record sources associated with that period.

First, assessment of vessel significance must be made within a well developed historical context. That political, social, military, economic and technological context is essential to understanding the nature of human activity associated with the remains of any ship. Although sufficient data exists to develop an excellent historical context to support assessments of shipwreck significance and identification of research priorities, little effort has been made in that direction.

Investigation of the historical source materials associated with Civil War vessels confirm that many gaps in our knowledge of blockade running can be filled through archival research. Detailed cargo-related records survive in judicial records, newspapers, auction advertisements, and manifests. Although architectural and construction records are minimal where sailing vessels engaged in blockade running are concerned, the records associated with steamers are quite numerous. Steamships were one of the most dramatic products of the Age of Engineering that changed ship construction. Engineers published extensive records of their work and patented their designs. A proliferation of secondary treatises on engineering associated with ship design and construction document practices that became progressively more uniform as construction materials were standardized and regulations for ship construction became increasingly complex. A systematic investigation of these and other record sources would identify data otherwise available only through on-site investigation of shipwreck remains.

Second, assessment of shipwreck significance and identification of research priorities should be made with specific consideration for the nature and extent of the associated resource base. While it is perhaps possible to identify those shipwrecks which are of paramount historical importance without a detailed examination of the associated resource base, assessing the significance of sites without a clear

connection to important events, individuals, or technological developments would be difficult. To responsibly assess the significance of those shipwreck sites, values must be determined in accordance with comparative criteria available only through a general assessment of the resource base. Until the shipwreck population of a given period can be quantified and categorized, it is virtually impossible to make judgements concerning significance and/or priorities for research. This research and an assessment of the resource base is particularly critical to the development of responsible priorities that realistically reflect resource values.

For Civil War period sites, this can be accomplished with a high degree of reliability. Nineteenth century shipwreck references became both more frequent and progressively more detailed as insurance became an essential aspect of maritime commerce, and a proliferation of newspapers broadcast the details of daily life. Naval communications became more extensive and a higher percentage of these documents have survived to preserve a record of activity at sea.

Third, shipwreck significance must be established with specific consideration for the nature and scope of the archaeological record both at the site in question and with respect to other resources in that respective category. Where wrecks are considered as representative of a particular category, the condition of the site and integrity of the archaeological record must be evaluated in determining significance and research potential. This makes site reconnaissance data particularly important. In some cases, valuable sites have been virtually destroyed by post Civil War salvage activity, others have been damaged or destroyed by the activities of modern looters and development. In other cases, high energy environments have destroyed the very aspects of the archaeological record that make the site valuable. Conversely, other sites in similar high-energy environments contain excellent material records. Without on-site reconnaissance surveys, these considerations cannot be adequately addressed.

Fourth, based on an assessment of the historical, archaeological, and anthropological interests in Civil War period shipwreck sites, it is apparent that significance and research potential are too complex for a polarized binary system. As there must be levels of significance designed to reflect a variety of historical, archaeological, and anthropological values, an ordered scale appears to be more appropriate. One approach to establishing such a scale might include the following categories:

ORDER OF
SIGNIFICANCESIGNIFICANCE
CRITERIA

- I. First-order shipwreck sites would include only those vessels determined to:
- a. be associated with historical events of national or international importance,
 - b. preserve a unique archaeological record that does not survive elsewhere in the data base,
 - c. contain historical and/or anthropological data essential to developing an understanding of past human activity.

Sites determined to be of first order significance would be identified and preserved for scientific investigation designed to preserve the remains of the vessel and recover data contained in the archaeological record. Protection of the site would be insured by designation as a first-order resource. With the exception of approved research, all on-site diving would be limited to non-destructive activities.

- II. Second-order shipwreck sites would include only those vessels determined to:
- a. be associated with events of importance to states or regions within the United States,
 - b. preserve an archaeological record that represents a major source of information within the data base,
 - c. contain historical and/or anthropological data that makes an essential contribution to developing an understanding of past human activity.

Sites determined to be of the second-order of significance would be identified and preserved for scientific investigation designed to recover the scientific information contained in the archaeological record and, if possible, preserve the remains of the vessel. With the exception of approved research, all on-site diving would be limited to non-destructive activities.

III. Third order shipwreck sites would include only those vessels determined to:

- a. be associated with events of local importance,
- b. preserve an archaeological record that represents one of several sources of information within the data base,
- c. contain historical and/or anthropological data that makes a contribution to enhancing our reconstruction and understanding of past human activity.

Sites determined to be of third-order significance would be identified and available for scientific research, educational instruction, and salvage designed to recover pertinent data preserved at the site. With the exception of approved research, educational and recreational projects, and salvage, all on-site diving would be limited to non-destructive activity.

IV. Fourth order shipwreck sites would include only those vessels determined to:

- a. have limited association with the historical events of the period,
- b. contain an minimal archaeological record due to circumstances associated with loss, environment, and/or man's activity,
- c. preserve archaeological and anthropological data contained and reproduced at other, higher order sites.

Sites determined to be of the fourth-order would be identified and available for student and directed amateur research, educational exercises, and salvage activity restricted by minimal data recovery requirements. With the exception of approved research, recreational and educational activities, and salvage, all on-site diving would be limited to activities that do not disturb the archaeological record preserved within the bottom sediments. Surface material associated with the site could be recovered if reported.

- V. Fifth order shipwreck sites would include only those sites determined to:
- a. have no significant association with the events but represent a resource worthy of protection for educational and recreational activity.

Sites determined to be of fifth-order significance would be identified and available for student and amateur research, and educational and recreational activities that are determined to be non-destructive.

- VI. Sixth-order shipwreck sites would include only those sites determined to:
- a. have no significant association with period events and human activities,
 - b. preserve no significant archaeological record.

Sites determined to be of sixth order significance would be identified and included in resource inventories but remain unprotected and available for any public or private use. No restrictions would be imposed on diving activities at the site.

SECTION 5 - CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Data generated by this investigation of the sites at Lockwoods Folly Inlet supports a number of conclusions about Civil War shipwrecks in general and the Lockwoods Folly vessels in particular. More generalized conclusions concern the significance of Civil War shipwrecks, the nature and scope of the associated historical and archaeological data base, and their potential for research. More specific conclusions relate to the BENDIGO, IRON AGE, and ELIZABETH.

General

The Cape Fear Civil War Shipwreck District nomination prepared by the Underwater Archaeology Unit of the North Carolina Division of Archives and History is based on the hypothesis that these vessels represent the "largest collection of Civil War shipwrecks anywhere in the world" (NCDAH, 1983). In addressing "General Significance" the nomination suggests that the vessels represent the "full range of rapidly evolving merchant vessels used to elude the Union blockade, as well as a compliment of naval warships involved in either restricting or assisting merchant traffic" (NCDAH, 1983). "The physical remains of these vessels" the nomination documents, "preserve important details concerning the transition in naval architecture and technology from sail to steam and wood to iron" (NCDAH, 1983). Material from these sites preserve both historical data and cultural evidence that can enhance our understanding of the American Civil War and highlight our historical awareness through educational and recreational programs to be developed by the State of North Carolina.

The nomination suggests that these vessels are significant in terms of three basic criteria. First, that they are "associated with events that have made a significant contribution to the broad patterns of history" in North Carolina and the United States. Second, that they "embody distinctive characteristics of a period and method of construction whose components lack individual distinction." And Third, shipwrecks in the district are "likely to yield information important to the nation's history and marine construction" (NCDAH, 1983).

Considering the Lockwood's Folly Inlet shipwrecks within the context of these areas of significance it is apparent that all three wrecks are associated with "broad patterns of history." Anglo-Confederate blockade running and Union efforts to prevent it was one of the major themes of Civil War maritime activity. Both the ELIZABETH and BENDIGO were operated by Fraser, Trenholm, and Company, one of the most successful Anglo-Confederate trading companies. The ELIZABETH, one of

several vessels seized in New Orleans in 1862, had been built prior to the Civil War in New York by the well established shipbuilder William Collyer and operated by the Southern Steamship Company of Charles Morgan. The BENDIGO was built in 1863 in Preston, north of Liverpool, and sold to agents of Fraser, Trenholm, and Company. The IRON AGE, was constructed by Nathaniel L. Thompson of Kennebunk, Maine. Constructed as an iron ore carrier, the hull was purchased by the United States Government and converted for use as a gunboat. While the vessels were not associated with historical events of singular consequence, they are certainly representative of those broad patterns of Union and Confederate maritime activity. Although none of the vessels can be considered as representative of the "state of the art" in ship construction each represents shipbuilding traditions that were an integral part of evolving nineteenth century technology.

The Lockwood's Folly Inlet shipwrecks are clearly significant elements contributing to the strengths of the district nomination. Yet, in considering historical and archaeological significance and the research potential of these shipwrecks, several major problems must be recognized. Although Civil war shipwrecks comprise a significant element of the total shipwreck population, the preliminary inventory included in this report confirms that few have been scientifically investigated. Thus, most of the available data has been generated by Civil War Centennial salvage projects that were carried out with little or no attention to archaeology. Projects like the recovery of the CAIRO, NEUSE, MUSCOGEE, and parts of the CHATTAHOOCHEE, and the salvage of material from the MODERN GREECE, ACADIA, CONSTANCE and MARY BOWERS provide excellent examples. While these projects have produced valuable collections of material, little or no archaeological information about the sites has been produced. Without wreck specific scientific data, it is virtually impossible to effectively assess the nature and scope of the archaeological record associated with Civil War shipwreck sites. As a result, the significance and research potential of Civil War shipwreck sites must presently be evaluated without benefit of a comprehensive understanding of the data base. Until a higher percentage of these sites have been located, identified, and archaeologically tested, effective assessment will be difficult and must be carried out on a vessel specific basis. The significance of each of the Lockwood's Folly Inlet sites is considered in accordance with criteria previously identified in this report.

This problem is compounded by the fact that although historical research associated with the American Civil War has been extensive, naval and maritime activities have not attracted the attention that political, social and terrestrial military activities have received. Good general treatments of these activities are available now, but more detailed aspects of naval and maritime activity remain to be thoroughly investigated. Historical research carried out during this investigation revealed that extensive sources of primary data survive in archival repositories in both the United States and Europe. For

the most part, this material has received little attention. The Cape Fear Civil War Shipwreck District nomination clearly illustrates the need for additional generalized background research.

This investigation of the historical record sources suggests that research designed to address general questions identified in the Specific Criteria section of the Cape Fear Civil War Shipwreck District nomination could best be answered through historical research and perhaps archaeological investigation of other sites. Examination of material carried as cargo in blockade runners can "add knowledge to the general understanding of Confederate trade and its economic system" however, with the exception of highly specific questions, historical sources may offer more efficient and productive sources of information. While "intact vessel remains can provide details on rapidly developing technological advances" these details can only be meaningful in a well developed historical context. Likewise, data gaps must be identified, not by site specific research but, in an historical and archaeological context broad enough to provide adequate perspective. As the Lockwood's Folly Inlet shipwrecks and their associated artifacts are the products of well documented shipbuilding traditions, engineering technology, and industrial production, site specific research should be designed in accordance with sound comprehensive documentary research.

While historical records are extensive, highly specific evidence is no doubt only preserved in the archaeological remains of Civil War vessels. Material possessions of the officers and crew would have received little attention except in those papers associated with condemnation proceedings, diaries, and memoirs. Cargo specific data from wrecked blockade runners have provided unique insight into industrial manufacturing. Wreck data preserves a vessel specific source of engineering and construction data that may not exist elsewhere. Although plans and surveys survive for a variety of vessels, those associated with other ships have been destroyed.

However, before this research potential can be accurately identified the associated archaeological data base must be established and criteria for significance developed. The need for this research is clearly identified in the Cape Fear Civil War Shipwreck District nomination. First, wreck specific data developed in the nomination is extremely limited. With the exception of sites examined in conjunction with activities of the U. S. Army Engineer District, Wilmington, most of the wreck specific descriptions consist of only cursory information. Additional problems arise from the fact that district shipwrecks are not assessed collectively or individually in the context of the total Civil War shipwreck population in North Carolina.

Thus, while this investigation confirms that A) the Lockwood's Folly Inlet Civil War shipwrecks are indeed "associated with broad patterns of North Carolina history;" B) the vessels under consideration embody distinctive characteristics of the period; and C) they are likely to yield "highly specific data unavailable elsewhere," the potential for

on-site research appears to be limited. Considering the Lockwood's Folly Inlet environment and the level of contemporary and post depositional site disturbance, the on-site research potential of these shipwrecks must be examined closely on a case-by-case basis within the existing historical context.

Specific

Identity of the BENDIGO: Both the historical and archaeological evidence considered as a result of this investigation confirm that vessel remains as the Bendigo site are indeed those of the British blockade runner BENDIGO. Although additional research would be required to develop an uncontestable identification, all historical and archaeological evidence supports that hypothesis. Of the three mid-nineteenth century wrecks in Lockwoods Folly Inlet, only the one historically identified as the Bendigo site corresponds to historical data associated with the design and construction of the BENDIGO. Vessel specifications identified in the correspondence of the US Consul at Liverpool and Certificates of British Registry for the BENDIGO correspond closely with specifications generated by on site investigation. Only the steam machinery of the Bendigo site corresponds to that known to have been installed in the ship.

In addition the geographical location, the orientation of the longitudinal axis of the hull of the Bendigo Site vessel is aligned with the longitudinal axis of the hull remains identified as the IRON AGE. This orientation corresponds with historical source data that confirms the IRON AGE grounded in an unsuccessful effort to tow the stranded BENDIGO into deep water. These conclusions are additionally reinforced by the fact that the USS IRON AGE and ELIZABETH can be reliably identified. The IRON AGE, although constructed of wood like the ELIZABETH, was fitted with a screw propeller and direct acting single cylinder steam machinery. Artifacts observed at the site include a lantern produced by William Porter, a well known U.S. Navy contractor, 9 inch shot equipped with U.S. ORDNANCE DEPARTMENT fuses, and a pin for a Dalghren gun carriage. The ELIZABETH was fitted with a walking beam engine and paddle wheels. While no evidence of the paddle wheels was observed, the machinery on the Elizabeth Site proved to be the remains of a walking beam propulsion system. In light of these findings, it is highly unlikely that the Bendigo Site remains are not those of the BENDIGO.

Percent of the BENDIGO surviving intact: Examination of the historical record associated with the loss and destruction of the BENDIGO confirms that the vessel was burned when efforts to refloat the ship failed. With the exception of wood structure that fell into water already filling the hull, all non-metal deck and superstructure appear to have been destroyed. However, wood hull structure protected by water flooding the hold as well as structural elements that could have fallen into the flooded hold could survive. Probing within the hull aft of the engineering space confirms that wood does survive intact in areas aft of the engineering space.

Photographs, probing and mapping of the exposed vessel structure suggest that most of the BENDIGO'S metal hull structure and steam machinery survive. Unlike more environmentally exposed Civil War shipwrecks, the structure aft of the engineering space retains considerable structural integrity. This is no doubt due to the fact that sand and sediments forming a shoal around the wreck provide support for the hull. While it is possible that hull structure forward of the engineering space also survives intact, it is likewise possible that periods of exposure associated with channel migration have permitted major structural elements to collapse. Probing suggests that forward of the engineering space, the hull has scour-settled by the bow, breaking the keel and keelson. While most of the original structural elements of the hull survive, they could be disarticulated to a greater degree than the stern, where structure appeared to survive to the level of the deck clamp. The fantail appears to have broken away and settled immediately aft of the sternpost. These findings confirm that aside from the deck and superstructure, the majority of the vessel's hull and machinery survives at the site.

Artifacts associated with the structure: Historical evidence confirms that the cargo of the BENDIGO had been removed prior to discovery by Union Vessels. Their investigation of the stranded vessel was however restricted by the fact that the BENDIGO had been scuttled and more than six feet of water had accumulated inside the hull. While it appears that salvage activities were for the most part successful, Confederates would have been forced to remove material from the ship under duress. Under those conditions it is difficult to imagine that salvage efforts were entirely successful. Inaccessible cargo and/or material too badly damaged to be of value could have been abandoned. Probing confirms that both structural and nonstructural evidence survives within the hull. While this would likely consist of limited cargo, personal effects and equipment, it could provide limited insight into a number of vessel specific historical and archaeological questions. However, unless these questions are specifically related to the BENDIGO or the site is going to be disturbed or destroyed, data can perhaps best be collected through research at other less environmentally exposed wreck sites.

Safety Zone: Due to the nature of the loss of the BENDIGO and subsequent salvage activity material associated with the surviving archaeological record appears to be closely associated with the vessel's hull structure. Although salvage activity could have resulted in the showard distribution of material from the wreck, there is no evidence to confirm that hypothesis. As the distribution of material appears to be limited and the primary value of the site appears to be associated with the hull structure, the 300 foot diameter circular boundary proposed by the Division of Archives and

History appears to be more than sufficient to insure protection of the site. While dredging closer to the sides of a vessel such as the BENDIGO would probably have little additional impact on the site, the conduct of that activity at the extremity of the boundary near the bow or stern could cause increased erosion in the vicinity of the wreck and result in damage to the surviving wreck fabric. Unfortunately, no supportive data are available and without site specific information the impact of dredging in the vicinity of the BENDIGO cannot be effectively assessed.

Status of Preservation: As no effort was made to carry out a test excavation that would provide artifacts from the BENDIGO, preservation of material will have to be considered in terms of other sites in similar environments. Aside from the vessel structure which appears to survive in an excellent state of preservation, artifacts and other associated material should be well preserved by the sediments. Within the confines of the hull, sediment has stabilized the associated remains.

Material recovered from the ELLA, RANGER, MODERN GREECE, and other Civil War period sites has been demonstrated to be quite well preserved. Glass, ceramics, and non-ferrous metals generally survive without major deterioration. Ferrous metals require extensive conservation but generally survive within a calcareous crust that preserves surface details. Inorganic material and rubberized fabric have been recovered at each of these sites and, although requiring extensive preservation treatment, survives in good condition.

Perhaps the best indication of potential preservation can be found on the IRON AGE site. Exposed by the migrating channel, the IRON AGE was found to contain well preserved, non-ferrous and ferrous metals, glass, ceramics, and organic materials such as structural wood. Considering that the BENDIGO environment is more stable than that of the IRON AGE, it can be assumed that preservation of associated material is quite good.

Channel Migration Damage: The extent of channel migration damage to the BENDIGO site is difficult to accurately determine as so little of the vessel structure is exposed. However probing indicates that channel related scour-settling has contributed to the severe hogging that is evident at the site and could have broken the keel forward of the engineering space. While additional structural damage cannot be ascertained, it is possible that portions of the BENDIGO's forward hull have collapsed. Although disarticulated, they are no doubt still preserved and remain a source of structural data.

Examining the remains of the IRON AGE provided an excellent opportunity to examine the effects of channel migration on the archaeological record. There it was apparent that the currents would resort lighter materials that had not been secured by the formation of a calcareous crust. Excavation of a navigation lantern located during the investigation confirmed that the lower portion of the hull, despite strong currents during the ebb tide and a high level of exposure, contained considerable associated material. Structural evidence appeared to be the most affected and that deterioration has been, no doubt, a factor of exposure to water column environment. Artifacts with lighter specific density have been carried away while heavier material has scour-settled onto hard consolidated sand or the lower hull structure. As very few wrecks in similar high energy environments have been investigated, there is little concrete evidence to draw upon for comparison.

Significance and Potential for Scientific Investigation: In attempting to identify and assess the BENDIGO's significance and potential for research, several areas of archaeological and historical interest must be given consideration. The wreck must be evaluated in an historical, archaeological, and management context.

The BENDIGO preserves an excellent source of vessel specific information. Engineering data preserved at the site appears to be in excellent condition and the oscillating steam machinery offers an opportunity to study contemporary engineering design. However, as the BENDIGO's machinery was of a common design found in numerous other blockade runners, its value must be considered with regard to the environment and other sources of data. Other sites in North Carolina (e.g. RANGER, VENUS, CONDOR, WILD DAYRELL, PEVENSEY and an unidentified site immediately north of the north jetty at Masonboro Inlet) and Bermuda (e.g. MARY CELESTIA and NOLA) were equipped with the same engine configuration. The hull offers additional and perhaps more significant engineering evidence from a period when iron and steel vessel construction was undergoing rapid development. The Certificate of British Registry for the BENDIGO suggests that the ship was "clench built on an iron frame." The clench building technique identified in the Certificate of British Registry consisted of an iron framework and wood hull planking. This could make the BENDIGO one of a limited number of composit hull vessels available for examination.

As such the BENDIGO would be more significant than perviously thought. While little specific construction evidence has been identified through historical research, there is the possibility that construction records and plans survive in repositories in Preston. As the nineteenth century engineer was quite prolific in recording design and construction features, the chances of finding manuscript source material would appear to be relatively high. Engineering data of a less vessel-specific nature regarding design and construction of steam

machinery, propulsion systems, hull design and construction have been well established. Engineering works are exceptionally well published and many sources are available for study.

The BENDIGO also preserves historical and archaeological data associated with the nonstructural archaeological record. Artifacts associated with the vessel may preserve some evidence of life on board blockade runners and cargo residue could confirm the nature of material slipped through the blockade. However, due to the fact that the BENDIGO was salvaged, scuttled, and burned, that record will be incomplete at best. As historical manuscript sources preserve excellent evidence of blockade run goods and supplies and other sites offer similar and more complete data, associated material is difficult to consider as a major factor in significance.

Finally, the BENDIGO's environment places limits on the nature and amount of work that can be done cost effectively. The dynamic tidal environment restricts extended scientific excavation. Without extensive protection to minimize the effects of a dynamic environment, little beyond archaeological salvage could be accomplished effectively. Likewise, the BENDIGO's environment places limitations on the site's potential for either recreational diving and education. Although educational limited objectives could be served during periods of low tide when the site is exposed, diving on the wreck has a limited attraction. In light of these considerations it would appear that the BENDIGO's potential for site specific research is moderate and highly vessel specific. In terms of previously identified significance criteria, the site appears to rate a third order of significance. Considering this and the nature of site environment, all but vessel specific research projects could best be served by historical research and investigation of other similar sites.

RECOMMENDATIONS

General

Investigation of the Civil War shipwrecks at Lockwoods Folly Inlet has shed considerable light on the management problems associated with vessels of the period that survive in North Carolina waters. In order to effectively manage these resources it is apparent that a detailed assessment of the associated historical data base must be made to further identify and assess sources of historical data and "gaps" in the data base. This is an essential prerequisite for assessment of the archaeological record and determination of significance and research potential for Civil War shipwreck sites.

At the same time it is essential to develop site specific data that can serve as the basis for assessing the nature and scope of the archaeological record associated with Civil War shipwreck sites in North Carolina. A manageable percentage of the Civil War shipwreck

population should be located, identified, and tested to permit such a determination. Until a context for management decisions can be established, it will continue to be very difficult to reliably establish significance and research potential.

As the North Carolina Division of Archives and History is responsible for management of Civil War shipwreck resources in North Carolina waters, that agency should give serious consideration to undertaking or supporting historical and archaeological research that will contribute to developing such a data base. As more work has been done on the Civil War shipwrecks than any other period, and as those sites appear to represent the most frequent threats to safe navigation, it would seem appropriate for the period to serve as a model for management activities associated with shipwreck sites associated with other historic periods.

Specific

As the Civil War shipwrecks at Lockwoods Folly Inlet represent a continuing concern to the United States Army Corps of Engineers, Wilmington District, consideration should be given to periodic monitoring of the wreck sites. As the navigation channel migrates, it should be possible to observe the effect on each wreck and collect additional data on the nature and scope of the archaeological record at each site as different material is exposed. In the event that one or more of the shipwreck sites becomes a threat to safe navigation and must be removed or destroyed, data and material salvage options should be identified to facilitate historical and archaeological data recovery. Salvage options should isolate those specific data unavailable elsewhere and identify recovery techniques compatible with available resources and environmental considerations.

In the event that channel maintenance or development activity in Lockwood's Folly Inlet threatens to destroy one of the Civil War shipwrecks, archaeological salvage must be considered to recover and preserve important aspects of the archaeological record associated with each threatened site. On the basis of this research, archaeological mitigation priorities for the BENDIGO, IRON AGE, and ELIZABETH should include the following considerations:

1. BENDIGO
 - a. Archaeological salvage designed to document design and construction features of the hull.
 - b. Archaeological salvage, document, conserve, and display or redeposit machinery.
 - c. Salvage of associated artifacts and cargo residue surviving within the confines of the hull structure.

2. IRON AGE

- a. Archaeological salvage designed to document design and construction features of the hull.
- b. Archaeological salvage, documentation, and redeposit of machinery.
- b. Sample and document associated artifacts and ordnance.

3. ELIZABETH

- a. Archaeological salvage designed to document design and construction features of the hull.
- b. Archaeological salvage, documentation, conservation, and display or redeposit of machinery.
- c. Archaeological recovery of associated artifacts and cargo surviving within the confines of the hull structure.

To avoid future complications, a comprehensive mitigation plan should be developed on the basis of site significance and research potential and adopted by the U. S. Army Engineer District, Wilmington. With the exception of development of that plan, testing designed to determine the nature of the BENDIGO's hull structure, additional investigation designed to further assess the scope of the archaeological record associated with the ELIZABETH, and continued periodic monitoring of the wreck sites, no additional investigation of the Civil War shipwrecks in Lockwood's Folly Inlet is recommended.

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Appendix A: Artifact Inventory

1. Sheathing Sample

Irregular section of copper sheathing 31 inches long and 12 inches in maximum width. Exhibits 2 inch tack pattern on exposed edge and 3 to 3 and 1/2 inch diagonal tack pattern over surface. Recovered 18 feet forward of sternpost on starboard side at sediment surface.

2. Coal Sample

Small 3 and 1/2 by 4 inch sample of anthracite coal. Recovered at base of engine bed aft of boiler.

3. Food Storage Jar

Clear glass vegetable or pickle storage jar. Octagonal body with sides 5 and 1/2 inches high at the shoulder and 1 and 1/8 inch flats. Total diameter 3 and 3/4 inches and total height 7 and 3/4 inches. Round throat above shoulder with one reinforce and flared mouth.

4. Bronze Fastner

Cast bronze spike 7 inches in length. Shank 5/16 by 5/16 inches, head 3/4 by 3/4 inches, and point produced by reduction in width of two opposite sides.

5. Fragments of Ironstone Plate

Two fragments of undecorated ironstone plate. One fragment consists of portion of base and rim and second consists of section of rim. Plate originally 10 inches in diameter. Unidentifiable makers stamp in base.

Appendix B

RAW DATA FROM PROBE SURVEY

Forward of Boilers

15' Center - 2' Iron
15', 2 to Port - 9' Sand
20' Center - 12' No Bottom
30' Center - 12' No Bottom

Aft of Boiler, Center Line

10' Aft - 6' Shell Hash
20' Aft - 6' Shell Hash
30' Aft - 7' Shell Hash
40' Aft - 7' Shell Hash
50' Aft - 7' Shell Hash
60' Aft - 4' Iron
70' Aft - 9' Hard Sand (Consolidated)
80' Aft - 9' Hard Sand
90' Aft - 10' Hard Sand

10' Aft of Boiler:

Center - 7' Iron	
2' to Port - 9'	2' to Star - 8' Iron
4' to Port - 5/7' Shell, 7/9' Sand, 9' Wood	4' to Star - 6' Shell
6' to Port - 5' Shell, 8' Iron	6' to Star - 10' Iron
8' to Port - 6' Shell	8' to Star - 9' Iron
	10' to Star - 7' Iron

20' Aft of Boiler:

Center - 5/7' Shell, 7/12' Sand, 12' Iron	
2' to Port - 5/7' Shell, 7/11' , 11' Wood	2' to Star - 5/7' Shell, 7 Sand
4' to Port - 5/7' Shell, 7/11' Sand	4' to Star - 6' Iron
6' to Port - 11' Iron	6' to Star - 5' Shell
8' to Port - 10' Wood	8' to Star - 1' Iron

30' Aft of Boiler:

Center - 7' Shell (Hard)	
2' to Port - 5/7' Shell, 7/9' Compact Sand	2' to Star - 5/7' Shell, 7' - End Shell
4' to Port - 5/7' Shell, 7/11' Sand, 11' Iron	4' to Star - 5/7' Shell, 7' - End Shell
6' to Port - 5/9' Shell, No Bottom	6' to Star - 5' Iron
8' to Port - 5/7' Shell, 7/9' Sand, 9' Wood	8' to Star - 1' Iron (Side)
10' to Port - 0' Iron	

40' Aft of Boiler:

Center - 5/6' Shell	
2' to Port - 5/7' Shell, 7/10 Sand, No Bottom	2' to Star - 5/7' Shell
4' to Port - 11' No Bottom	4' to Star - 5/6' Shell
6' to Port - 5/7' Shell 7/11, Sand, 11' Iron	6' to Star - 5/7' Shell
8' to Port - 5' Shell	8' to Star - 4' Iron
10' to Port - 4' Iron (Side of Hull)	

50' Aft of Boiler:

Center - 5/7' Shell - End	
2' to Port - 5' - End Shell	2' to Star - 5/7' Shell (Hard)
4' to Port - 5/7' Shell, 7/8' Sand, 8' Iron	4' to Star - 5/7' Shell (Hard)
6' to Port - 4' Iron	6' to Star - 2' Iron
8' to Port - 2' Iron (Side)	8' to Star - 6' Hard Sand
10' to Port - 5' Light Hash, 9' Consolidated Sand	

55' Aft of Boiler:

Center - 8' Solid	
2' to Port - 10' Iron	
4' to Port - 5' Iron	
6' to Port - 2' Iron	
8' to Port - 8' Hard Sand	
10' to Port - 11' Sand	

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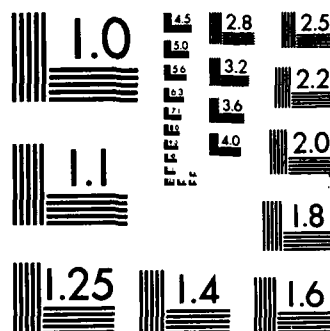
UNDERWATER ARCHAEOLOGICAL RECONNAISSANCE AND HISTORICAL 2/2
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

58' Aft of Boiler:

Center - 8' Iron
2' to Port - 9.5' Iron
4' to Port - 3' Iron
6' to Port - to 12' Sand

60' Aft of Boiler:

Center - 4' Iron	
2' to Port - 5' Iron	2' to Star - 4' Iron
4' to Port - Sand, Shell 10'	4' to Star - 1' Iron
6' to Port - 12' Nothing	6' to Star - 1.5' Iron
	8' to Star - 5/7 Shell

END

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